LAMPIRAN A
MANUAL PROGRAM

8.1 General Remarks

The program PCF3D is a nonlinear finite element analysis program for reinforced and pre-stressed three dimensional concrete frames, taking into account geometric and material nonlinearities, and the time dependent effects of loads history, temperature history, creep, shrinkage and aging of concrete and relaxation of pre-stressing steel.

The program has been written in FORTRAN IV language, and has been developed at the IBM 4341 computer of the university of California at Berkeley.

8.2 General structure of the program and features of each subroutine

The program is composed of a main subroutine that distributes the flow to seven other subprograms, each of which can be composed by several subroutines, the architecture of the program is shown in figure 8.1, where the relationship among the subroutines is indicated.

The features of each subroutine are as follows :

Main Program	Distributes the flow over different main subroutines. Initializes vectors and matrices. Performs the nonlinear strategies and checks convergence and serviceability criteria.
Subroutine INPUT	Reads input data that do not depend in time steps, loads steps or iterative procedure, such as initial geometry of the structure, initial material properties, pre-stressing information, etc.
Subroutine PRTLD	Obtains the equivalent joint load vector due to pre-stressing at transfer, taking into account pre-stressing losses due to friction, anchorage slip, etc.
Subroutine LOAD	inputs data corresponding to each time step, such as joint loads, material properties, load factors, nonlinear strategy to follow at the current time step. Calculate the fictitious forces due to imposed displacements at supports.
Subroutine INSTR	Obtains non-mechanical strain due to temperature variation, shrinkage and aging to concrete and relaxation of pre-stressing steels. Calls subroutine CREEP to obtain initial creep strain and then forms the initial strain load-vector.
Subroutine CREEP	obtains the non-mechanical strain due to creep of concrete.
Subroutine UPDATE	for each load steps accumulates external joint loads, initial strain load vector and load factors.
Subroutine STIFF	forms the element stiffness matrix, performs the static condensation, transforms to global coordinates, assembles global structural matrix and checks for structural failure.

Subroutine SYMSOL	in core banded equation solver. Obtains increments of displacements in global coordinates. Checks for singularity of the stiffness matrix. SYSSOL (1) triangularizes the newly formed stiffness matrix, while SYMSOL (2) uses the already triangularized and strored stiffness matrix.
Subroutine STRESS	Transforms global displacement increments to local element axes, updates nodal coordinates, obtains element strains, support reactions and unbalanced load vector.
Subroutine CONCRT	Obtains stresses in concrete filaments, form the stress-strain relationship. Performs state determination.
Subroutine STEEL	Obtains stresses in reinforcing steel from the stress-strain relationship. Performs state determination.
Subroutine SDPS	obtains new length of pre-stressing segments, stresses and pre-stressing segments forces. Performs state determination.
Subroutine BMTORQ	Obtains torque in the beam element, from the tri-linear torque-twist relationship.
Subroutine NLGEOM	Updates element orientation matrix for large displacement analysis.
Subroutine RESIST	Obtains internal resisting load vector for each element by adding the contribution of concrete, reinforcing and pre-stressing steel. Assembles for the whole structure.
Subroutine OUTPUT	Prints results. The following information can be printed: joint displacement, support stresses and material state number for each concrete and reinforcing steel filament, element internal forces at each Gauss point, strains, stresses and forces at each pre-stressing steel segment.

8.3 Flow Chart

The flow chart diagram of the computer program PCF3D is the one shown in fig.8.2. the variables in the flow chart are defined as follows :

ITIME	Time step counter
NTIME	Number of time steps
LST	Loads step counter
NLST	Number of load steps for the current time step.
ITER	iteration counter.
NITER	maximum number of iterations allowed.
KCNT	Code of nonlinear strategy adopted in the current time step. If KCNT = 1, displacement control. If KCNT = 0, load control.

8.4 additional comments about the features and organization of the program

8.4.1 Types of analysis that can be performed

The structure can be analyzed with program PCF3D according to four different approaches. These are :

1. linear- elastic analysis.
2. nonlinear-material, small displacement
3. elastic material and geometry
4. Nonlinear material and geometry.
5. any of the above possibilities with time dependent analysis.

8.4.2. Structural loading conditions

The external loads are assumed to be applied only at the joints. Distributed loads may be converted into equivalent joint loads either by the consistent load method or a lumped formulation. Imposed displacement and rotations can be applied at the supported joints.

Temperature and shrinkage distributions contributions considered are: Constant values for all the elements in the structure, different value for each element (but constant over the cross section), and planar variation for each element. This option is performed by specifying the value of the temperature or shrinkage strain, at the coordinates, in local element system, of these three points.

When incremental analysis is performed (with or without equilibrium iterations) different load factors for each load step are specified for external loads, initial strain load vector and controlled displacement, respectively.

8.4.3 Non-linear strategies

Two different nonlinear solution schemes can be selected:

- Load control (for each load step iterations are performed with constant level of the external load). This procedure is the most usual, and is utilized to obtain the maximum load that the structure can carry.
- displacement control (for each load step, the iterations are performed by varying the external load level and keeping the given value of the displacement controlled). This technique is used when post-buckling behavior of a structure is to be studied.

8.4.4 uniaxial or biaxial bending

The program has the capability of analyzing planar frames with symmetric cross section, subjected to uniaxial bending, as a particular case of a 3-D frame. For these cases the amount of storage and computer time necessary to solve a problem is much less than in a general 3-D case. The, the cross section can be divided into layers, parallel to the y local axes, in-stead of filaments.

8.4.5 Data management. Intermediate variables

The number of variables to be stored in order to perform a non linear time dependent analysis of a reinforced or pre-stressed concrete frame is enormous. In the case of three dimensional concrete frames, in additional to the variables associated with joints (loads, displacement , etc.) a number of variables related to the filaments must be stored. These variables can be mechanical, nonmechanical and total strains, stresses, etc. For every concrete and steel filament, calculated at every gauss point in every element. In order to reduce the amount of central memory occupied by these variables, out of core storage is used for the variables associated to the concrete and steel filaments.

8.5 PCF3D INPUT DATA FORMAT

1. TITLE (20A4)- 1 line

Col. 1 – 80	TITLE	Title of the problem

2. CONTROL INFORMATION (10IS, 3F10.0) – One line

Col.	1 – 5	NJ	Number of joints
Col	6 – 10	NSJ	Number of supported joints
Col	11 – 15	NM	Number of elements
Col	16 – 20	NSEC	Number of different types of cross sections.
Col	21 – 25	NSTOR	Number of different torsional models
Col	26 – 30	IPB	Type of bending problem: IPB = 0 Biaxial problems IPB = 1 Uniaxial bending
Col	31 – 35	NCNC	Number of different concretes
Col	36 – 40	NSNS	Number of different reinforcing steel materials
Col	41 – 45	KPRT	Pre-stressing code: KPRT = 0 there is no pre-stressing KPRT = 1 there is pre-stressing
Col	46 – 50	KCNC	input code for material properties; KCNC = 1 Input ACI parameters KCNC = 2 Input experimental results
Col	51 – 60	AGE	Age of concrete in days at time of initial loading
Col	61 – 70	TZERO	Reference temperature (in centigrade degrees)
Col	71 – 80	ALPHA	Coefficient of thermal expansion, (constant and equal for steel and concrete)

3. NODAL COORDINATE (15,3F10.0) – one line per each node

Col	1 – 5	I	Joint number
Col	6 – 15	X(I)	X – coordinate in globals
Col	16 – 25	Y(I)	Y – coordinate in globals
Col	26 – 35	Z(I)	Z – coordinate in globals

4. SUPPORT ORIENTATION MATRIX (18,9F8.0) – one line per each supported Joint

Col	1 – 8	I	Supported joint number
Col	9 – 16	XS(1)	X – coordinate for auxiliary node in spring 1
Col	17 – 24	YS(1)	Y – coordinate for auxiliary node in spring 1
Col	25 – 32	ZS(1)	Z – coordinate for auxiliary node in spring 1
Col	32 – 40	XS(2)	X – coordinate for auxiliary node in spring 2
Col	41 – 48	YS(2)	Y – coordinate for auxiliary node in spring 2
Col	49 – 56	ZS(2)	Z – coordinate for auxiliary node in spring 2
Col	57 – 64	XS(3)	X – coordinate for auxiliary node in spring 3
Col	65 – 72	YS(3)	Y – coordinate for auxiliary node in spring 3
Col	73 – 80	ZS(3)	Z – coordinate for auxiliary node in spring 3

5. SPRING CONSTANT (I5, 6E10.0) – one line per each supported node

Col	1 – 5	NS(I)	Supported joint number
Col	6 – 65	SP(I,J)	Value of the spring constants at node I, J = 1,6

6.CROSS SECTION DATA – one set of lines per each different cross section

6.1 General Data (SI5, SF10.0) – one line

Col	1 – 5	ISEC	Section type number
Col	6 – 10	NCLY(I)	Number of concrete layers normal to y - axis
Col	11 – 15	NCLZ(I)	Number of concrete layers normal to z - axis
Col	16 – 20	NFS(I)	Number of reinforcing steel filaments
Col	21 – 25	NFB(I)	Number of rows of C matrix used to define the cross section shape (C matrix is called ID in the program)
Col	26 – 35	YMP(I)	Maximum positive distance from center of reference to the circumscribed rectangle, in Y direction
Col	36 – 45	ZMP(I)	Maximum positive distance from center of reference to the circumscribed rectangle, in Z direction
Col	46 – 55	YMN(I)	Maximum negative distance from center of reference to the circumscribed rectangle, in Y direction
Col	56 – 65	ZMN(I)	Maximum negative distance from center of reference to the circumscribed rectangle, in Z direction
Col	66 – 75	RTJ(I)	Torsional stiffness Constant

6.2 Matrix for the definition of the cross section shape (315)
one line for each row of IB matrix

Col	1 – 5	IB(I,J,1)	Number of current physical layer
Col	6 – 10	IB(I,J,2)	Column in which concrete start
Col	11 – 15	IB(I,J,3)	Column in which concrete ends.
Col	16 – 20	IB(I,J,4)	Material code for the current layer

6.3 Definition of steel filaments geometry (3F10.0)
One line for each steel filament. Skip if NFS(I) = 0

Col	1 – 10	AS(I,J)	Steel area of filament J in section Type I
Col	11 – 20	ESY(I,J)	Y – eccentricity of filament J
Col	21 – 30	ESZ(I,J)	Z – eccentricity of filament J.

7. TORSIONAL PROPERTIES (SE10.0) – one line for each torsional model

Col	1 – 10	TCR (I)	Torque at first cracking
Col	11 – 20	TYP (I)	Torque at first yielding
Col	21 – 30	ACR (I)	Twist at first cracking
Col	31 – 40	AYP (I)	Twist at first yielding
Col	41 – 50	AUL (I)	Ultimate Twist

8. MEMBER DATA (61S,3F10.0) – one line per elemen

Col	1 – 5	L	Element Number
Col	6 – 10	NODI(L)	Node at I end
Col	11 – 15	NODJ(L)	Node at J end
Col	16 – 20	MESC(L)	Cross section type of the current element
Col	26 – 30	KTO(L)	Torsional behavior model of this element
Col	31 – 40	XA(L)	Global X coordinate of orientation auxiliary node
Col	41 – 50	YA(L)	Global Y coordinate of orientation auxiliary node
Col	51 – 60	ZA(L)	Global Z coordinate of orientation auxiliary node

9. PRESTRESSING DATA (skip if KPRT = 0)

9.1. Control information (41S,4F10.0) – one line

Col	1 – 5	ITRANS	Time step when prestressing is transferred
Col	6 – 10	NTEND	Number of tendons
Col	11 – 16	NPS	Number of prestressing segments
Col	16 – 20	NPT	Number of point used to define stress – strain curve of prestressing steel
Col	21 – 30	FPSY	0.1% offset yield stress of prestressing steel
Col	31 – 40	ROZR	Wobble friction coefficient

Col	41 – 50	ROZC	Curvature friction coefficient
Col	51 – 60	CRPS	Coefficient for the relaxation loss. Use CRPS = 10 for ordinary prestressing steel

9.2. Stress - strain curve for prestressing steel (10E8.0)
One line

Col	1 – 80	PSF(I)	Stress of point I
		PSE(I)	Strain of point I (I=1,NPT,NPT<=5)

9.3 Tendon information (4IS,4F10.0) – one line for each tendon

Col	1 – 5	I	Tendon number
Col	6 – 10	NIN (I)	Number of element in which tendon start
Col	11 – 15	NFN (I)	Number of element in which tendon ends
Col	16 – 20	INDP(I)	Jacking code : INDP(I) = 1 Jacking from I end INDP(I) = 2 Jacking from J end INDP (I) = 3 Jacking from both ends
Col	21 – 30	AREAT(I)	Steel area of tendon I
Col	31 – 40	PAI (I)	End forces when jacking from I end
Col	41 – 50	PAJ (I)	End forces when jacking from J end
Col	51 – 60	DESL (I)	Anchorage slip

9.4 Prestressing segment data (3IS, 4F10.0) – one line for each segment

Col	1 – 5	I	Segment number
Col	6 – 10	NPS(I)	Element in which this segment is embedded
Col	11 – 15	NTPS(I)	Presstressing tendon to which the segment belongs
Col	16 – 25	EY1(I)	Y eccentricity of segment at I end
Col	26 – 35	EZ1(I)	Z eccentricity of segment at I end
Col	36 – 45	EY2(I)	Y eccentricity of segment at J end
Col	46 – 51	EZ2(I)	Z eccentricity of segment at J end

Note : this eccentricity are in element local coordinate

10. MATERIAL PROPERTIES

10.1 Concrete properties

ACI Properties (KCNC=1) (9F10.0) – one line per each different concrete

Col	1 – 10	FPC28 (K)	28 day strength in psi (enter with negative sign)
Col	11 – 20	WGT(K)	Weight per unit volume in lb/cu.ft.
Col	21 – 30	ACNC (K)	coefficient “a” to compute f’c(t)

Col	31 – 40	BCNC (K)	coefficient "b" to compute f'c(t)
Col	41 – 50	RCMP (K)	ratio rc in $f_c'' = r_c . f_c'$
Col	51 – 60	RTNS (K)	ratio rt in $f_t' = rt\sqrt{w.f_c'}$
Col	61 – 70	RCRP1 (K)	ratio $r_1 = f_c'' / \sigma$ up to which $\sigma_e = \sigma$ in creep calculation (usually = 0.35)
Col	71 – 80	RCRP2 (K)	ratio $r_2 = \sigma_e / \sigma$ when $\sigma = f_c''$ in creep calculation (usually = 1.865)
Col	81 – 90	ECU(K)	Ultimate compressive strain. Enter with negative sign.

Test result (KCNC = 2) (2E10.0,SF10.0) – one line per each different concrete

Col	1 – 10	ECI(K)	Initial modulus at the age of initial loading
Col	11 – 20	G(K)	Shear modulus at the age of initial loading
Col	21 – 30	FCDP(K)	Compressive strength fc". Enter with negative sign
Col	31 – 40	FTP(K)	Tensile strength
Col	41 – 50	ECU (K)	Ultimate compressive strain (negative)
Col	51 – 60	RCRP1(K)	ratio $r_1 = f_c'' / \sigma$ up to which $\sigma_e = \sigma$ in creep calculation (usually = 0.35)
Col	61 – 70	RCRP2 (K)	ratio $r_2 = \sigma_e / \sigma$ when $\sigma = f_c''$ in creep calculation (usually = 1.865)

10.2 Steel Properties (2E10.0,2F10.0) – one card for each different steel

Skip if NSNS = 0

Col	1 – 10	ES1(K)	First modulus
Col	11 – 20	ES2(K)	Second modulus
Col	21 – 30	FSY(K)	yielding stress
Col	31 – 40	ESU(K)	Ultimate strain

11. STRUCTURAL ANALYSIS CONTROL DATA (9I5) – one line (*)

Col	1 – 5	NTIME	Number of time steps
Col	6 – 10	NITI	Number of iterations allowed for intermediate loads steps
Col	11 – 15	NITF	Number of iterations allowed for final load step
Col	16 – 20	KOUT	Output code : If KOUT = 1 output results after every iteration If KOUT = 0 Output results only at the load steps

(*) Note: If KPRT ≠ 0 (there is prestressing) it is convenient

Col	21 – 25	ITAN	Type of analysis code : If ITAN = 0 Linear analaysis If ITAN = 2 Nonlinear material, small displacement If ITAN = 3 Nonlinear material and geometry
Col	26 – 30	KSTR	Stress output code. Number of element in which the stresses are to be output
Col	31 – 35	JRESP	Output code for intermediate values. Use JRESP = 0
Col	36 – 40	KTEMP	Code for temperature effects: If KTEMP = 0 no temperature effects are considered If KTEMP = 1 Constant variation of temperature in all the structure If KTEMP = 2 Planar variation of temperature over the cross section, different for each element
Col	41 – 45	KSHRNK	Code for shrinkage effects : If KSHRNK = 0 No shrinkage effects If KSHRNK = 1 Constant shrinkage in the structure If KSHRNK = 2 Planar variation for the each element

12. ELEMENT IN WHICH STRESSES ARE OUTPUT (16IS)
Skip if KSTR = 0 (None element) or KSTR = NM (All elements)

Col	1 – 80	KELEM(I)	Element Number. I = 1, KSTR

13. COVERGENCE RATIO TOLERANCE

Col	1 – 10	TOLI	Displacement ratio tolerance for intermediate load steps
Col	11 – 20	TOLF	Displacement ratio tolerance for final load step
Col	21 – 30	TOLC	Displacement ratio tolerance for changing stiffness
Col	31 – 40	TOLL	Maximum unbalanced load allowed
Col	41 – 50	TOLM	Maximum unbalanced moment allowed
Col	51 – 60	TOLD	Maximum allowed displacement
Col	61 – 70	TOLR	Maximum allowed rotation

14. LOAD INFORMATION – one set of line for each time step

14.1 Control load information (7I5,F10.0) – one line

Col	1 – 5	TIME	Time step number
Col	6 – 10	NLS	Number of loads steps for the current time steps
Col	11 – 15	NLJ	Number of loaded joints
Col	16 – 20	NDJ	Number of supported nodes with imposed displacement
Col	21 – 25	KCNT	Nonlinear strategy code for the current time step : KCNT = 0 Load control KCNT = 1 displacement control
Col	26 – 30	NDC	Node with controlled displacement. Use NDC = 0 if KCNT = 0
Col	31 – 35	LDEG(*)	Controlled degree of freedom in node NDC. Use NDC = 0 if KCNT = 0
Col	36 – 45	DDISP	Maximum value of control displacement. Use DDISP = 0 if KCNT = 0

14.2 Nodal loads in global coordinate (IS,6F10.0) – one line

Skip if Number of loaded joint (NLJ) = 0

Col	1 – 5	I	Loaded joint number
Col	6 – 65	PLOAD(J)	Load in global coordinate (J= 1,6) acting upon the joint J

14.3 Imposed displacement in global coordinate (IS,6F10.0) – one line

Skip if there are no joints with imposed displacement (NDJ = 0)

Col	1 – 5	NDI	Number of the node with imposed displacement
Col	6 – 65	DES (NDI, J)	Value of the imposed displacement for each of the six degrees of freedom (J=1, 6) of node number NDI

(*) NOTE: LDEG = 1,6 depending of the DOF controlled

For axial displacement (u)	LDEG = 1
For transversal displacement (v)	LDEG = 2
For transversal displacement (w)	LDEG = 3
For rotational about x axis	LDEG = 4
For rotational about y axis	LDEG = 5
For rotational about z axis	LDEG = 6

14.4 Load factor for load or displacement steps. (I5, 3F10.0)

Provide one line for each load or displacement step in current time step (*)

Col	1 – 5	LS	Load Step number
Col	6 – 15	FLOAD(LS)	Factor for external loads
Col	16 – 25	FINST (LS)	Factor for initial strain load
Col	26 – 35	FDISP(LS)	Factor for controlled displacement This factor will scale the value of the DDISP

14.5 Time increasing

Col	1 – 10	DTIME	Time increment, in days, for the current time interval

14.6 Creep Coefficient (3E10.0) – one line for each different concrete

Skip if ITIME = 1

Col	1 – 30	XA1(M)	
		XA2(M)	Creep coefficient a_1, a_2, a_3, for the time step
		XA3(M)	t_{n-1}

NOTE: when controlled displacement is used, it is necessary to specify FLOAD = 1. the program scale the external load in order to obtain the specified value of the controlled d.o.f. Prestressing can be introduced gradually by load steps. Since presstressing is treated as an initial strain load vector, its value is controlled by factor F1N3T (LST)

14.7 Current concrete properties (3E10.0) – one line for each concrete

Skip if ITIME = 1

Col	1 – 10	EC1(M)	Current initial modulus
Col	11 – 20	FCDP(M)	Concrete compressive strength (enter negative)
Col	21 – 30	FTP	Concrete tensile strength

14.8 Shrinkage strain increment. Skip if KSHRNK = 0

14.8.1 Constant value for all the structure (KSHRNK = 1) (F10.0)
One line

Col	1 – 10	DEPSS	Shrinkage strain

14.8.2 Planar variation (KSHRNK = 2) (I8,9E8.2)

Increment of shrinkage starin for the current time step are specified at three arbitrary points of the cross section for each element. The shrinkage strain increment for each filament is automatically obtained by the program by fitting plane surface of shrinkage strain on the section

Col	1 – 8	I	Current element number
Col	9 – 16	SY(1)	Y coordinate, in locals of the first point
Col	17 – 24	SZ(1)	Z coordinate, in locals of the first point
Col	25 – 32	SS(1)	Shrinkage strain increment at the point 1
Col	33 – 40	SY(2)	Y coordinate, in locals of the second point
Col	41 – 48	SZ(2)	Z coordinate, in locals of the second point
Col	49 – 56	SS(2)	Shrinkage strain increment at the point 2
Col	57 – 64	SY(3)	Y coordinate, in locals of the third point
Col	65 – 72	SZ(3)	Z coordinate, in locals of the third point
Col	73 – 80	SS(3)	Shrinkage strain increment at the point 3

14.9 Temperature value (skip if KTEMP = 0)

14.9.1 Constant value in all the structure (KTEMP =1)(F10.0)
One line

Col	1 – 10	TEMP	Temperature (in centigrade degrees) (*)

14.9.2 Planar variation (KTEMP = 2) (I8,9F8.0) – one card for each element

Col	1 – 8	I	Element number
Col	9 – 16	YT(1)	Y – coordinate, in locals, of first point
Col	17 – 24	ZT(1)	Z – coordinate, in locals, of first point
Col	25 – 32	TT(1)	Temperature, in degrees centigrade, of first point
Col	33 – 40	YT(2)	Y – coordinate, in locals, of second point
Col	41 – 48	ZT(2)	Z – coordinate, in locals, of second point
Col	49 – 56	TT(2)	Temperature, in degrees centigrade, of second point
Col	57 – 64	YT(3)	Y – coordinate, in locals, of third point
Col	65 – 72	ZT(3)	Z – coordinate, in locals, of third point
Col	73 – 80	TT(3)	Temperature, in degrees centigrade, of third point

(*) Temperature values for this option are specified at three arbitrary points of cross section for each element. The value of the temperature at each filament is automatically obtained by the program, by fitting a planar surface of temperatures into the section.s

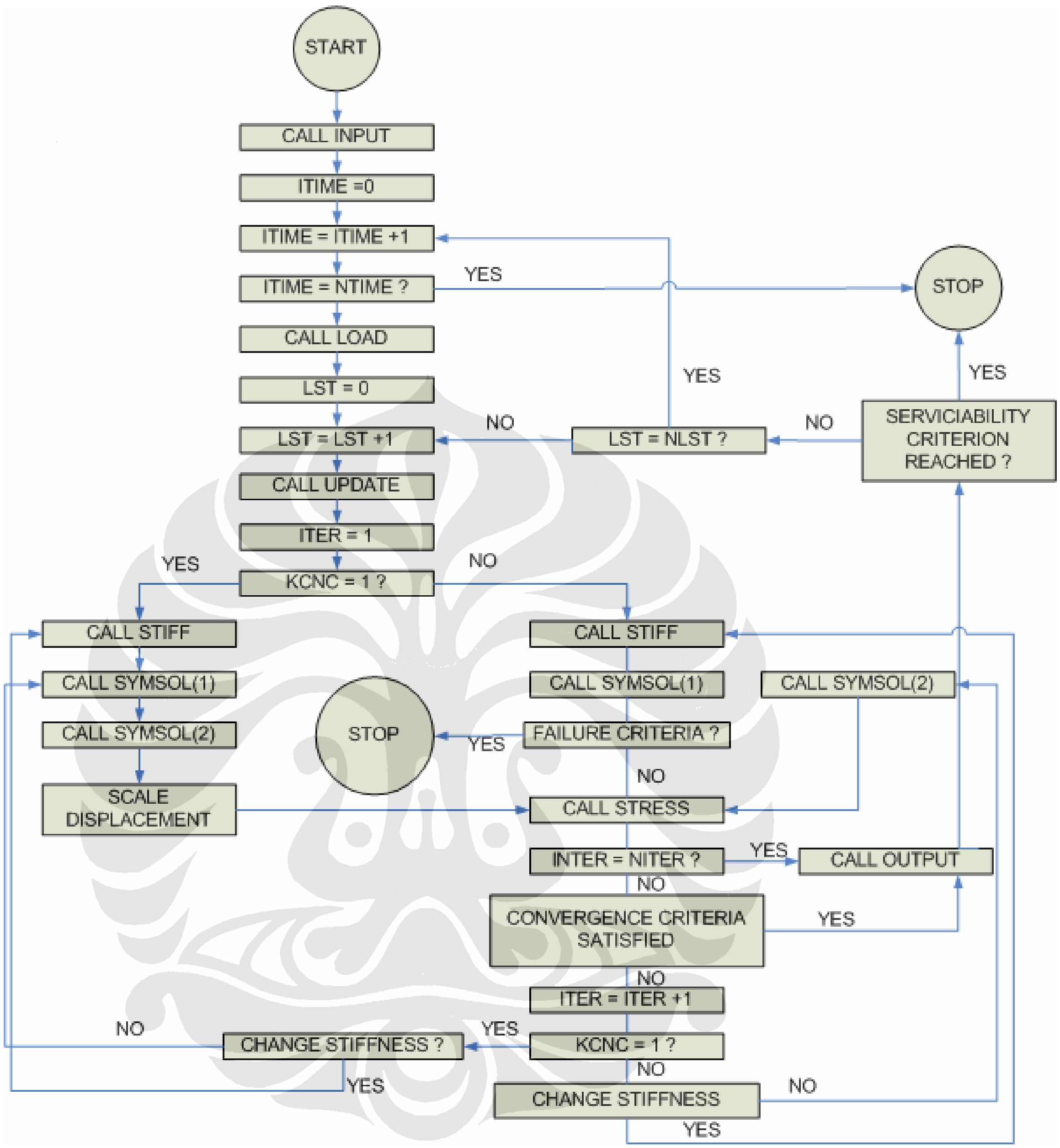

Figure 8.1. Program flow chart

LAMPIRAN B
INPUT STUDI KASUS

1. BEAM 1

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BEAM 1 (MONOTOMIC LOADING)
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7.0,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115.0,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.E+10,1.E+10,1.E+10,1.E+10,0.E+10,1.E+10
20,0.E+10,1.E+10,1.E+10,1.E+10,0.E+10,1.E+10
1,10,10,2,10,6,6,-6,-6,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
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9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.03
1,1,20,2,0.45,0,85.05,0
1,1,1,0,-3.25,0,-3.25
2,2,1,0,-3.25,0,-3.25
3,3,1,0,-3.25,0,-3.25
4,4,1,0,-3.25,0,-3.25
5,5,1,0,-3.25,0,-3.25
6,6,1,0,-3.25,0,-3.25
7,7,1,0,-3.25,0,-3.25
8,8,1,0,-3.25,0,-3.25
9,9,1,0,-3.25,0,-3.25
10,10,1,0,-3.25,0,-3.25
11,11,1,0,-3.25,0,-3.25
12,12,1,0,-3.25,0,-3.25
13,13,1,0,-3.25,0,-3.25
14,14,1,0,-3.25,0,-3.25
15,15,1,0,-3.25,0,-3.25
16,16,1,0,-3.25,0,-3.25
17,17,1,0,-3.25,0,-3.25
18,18,1,0,-3.25,0,-3.25
19,19,1,0,-3.25,0,-3.25
20,20,1,0,-3.25,0,-3.25
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
0.1,0.1,0.1,0.1,0.1,0.5,0.5
1,12,2,0,1,11,3,-0.05
8,0.,0.,-0.1,0.,0.,0.
14,0.,0.,-0.1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

2. BEAM 2

BEAM 2.4(Aps=0.1)
21,2,20,1,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,2,10,6,6,-6,-6,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0

5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.25,0,47.25,0
1,1,1,0,-1.24,0,-1.24
2,2,1,0,-1.24,0,-1.24
3,3,1,0,-1.24,0,-1.24
4,4,1,0,-1.24,0,-1.24
5,5,1,0,-1.24,0,-1.24
6,6,1,0,-1.24,0,-1.24
7,7,1,0,-1.24,0,-1.24
8,8,1,0,-1.24,0,-1.24
9,9,1,0,-1.24,0,-1.24
10,10,1,0,-1.24,0,-1.24
11,11,1,0,-1.24,0,-1.24
12,12,1,0,-1.24,0,-1.24
13,13,1,0,-1.24,0,-1.24
14,14,1,0,-1.24,0,-1.24
15,15,1,0,-1.24,0,-1.24
16,16,1,0,-1.24,0,-1.24
17,17,1,0,-1.24,0,-1.24
18,18,1,0,-1.24,0,-1.24
19,19,1,0,-1.24,0,-1.24
20,20,1,0,-1.24,0,-1.24
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
0.01,0.01,0.01,7.5,15,0.75,0.75
1,12,2,0,1,11,3,-0.075

8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05

3. BEAM 3

```
BEAM 3.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,2,10,6,6,-6,-6,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
```

5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.25,0,47.25,0
1,1,1,0,-3.25,0,-3.25
2,2,1,0,-3.25,0,-3.25
3,3,1,0,-3.25,0,-3.25
4,4,1,0,-3.25,0,-3.25
5,5,1,0,-3.25,0,-3.25
6,6,1,0,-3.25,0,-3.25
7,7,1,0,-3.25,0,-3.25
8,8,1,0,-3.25,0,-3.25
9,9,1,0,-3.25,0,-3.25
10,10,1,0,-3.25,0,-3.25
11,11,1,0,-3.25,0,-3.25
12,12,1,0,-3.25,0,-3.25
13,13,1,0,-3.25,0,-3.25
14,14,1,0,-3.25,0,-3.25
15,15,1,0,-3.25,0,-3.25
16,16,1,0,-3.25,0,-3.25
17,17,1,0,-3.25,0,-3.25
18,18,1,0,-3.25,0,-3.25
19,19,1,0,-3.25,0,-3.25
20,20,1,0,-3.25,0,-3.25
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
0.01,0.01,0.01,10,20,1,1
1,12,2,0,1,11,3,-0.1

8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05

4. BEAM 4

```
BEAM 4.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,4,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
0.44,-0.9375,-4.875
0.44,0.9375,-4.875
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
```

3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.1375,0,25.9875,0
1,1,1,0,-2.92,0,-2.92
2,2,1,0,-2.92,0,-2.92
3,3,1,0,-2.92,0,-2.92
4,4,1,0,-2.92,0,-2.92
5,5,1,0,-2.92,0,-2.92
6,6,1,0,-2.92,0,-2.92
7,7,1,0,-2.92,0,-2.92
8,8,1,0,-2.92,0,-2.92
9,9,1,0,-2.92,0,-2.92
10,10,1,0,-2.92,0,-2.92
11,11,1,0,-2.92,0,-2.92
12,12,1,0,-2.92,0,-2.92
13,13,1,0,-2.92,0,-2.92
14,14,1,0,-2.92,0,-2.92
15,15,1,0,-2.92,0,-2.92
16,16,1,0,-2.92,0,-2.92
17,17,1,0,-2.92,0,-2.92
18,18,1,0,-2.92,0,-2.92
19,19,1,0,-2.92,0,-2.92
20,20,1,0,-2.92,0,-2.92
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11

```
0.01,0.01,0.01,45,45,4,4
1,12,2,0,1,11,3,-0.4
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

5. BEAM 5

BEAM 5.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,4,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
0.31,-1.0,-4.938
0.31,1.0,-4.938
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0

3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.1375,0,25.9875,0
1,1,1,0,-2.92,0,-2.92
2,2,1,0,-2.92,0,-2.92
3,3,1,0,-2.92,0,-2.92
4,4,1,0,-2.92,0,-2.92
5,5,1,0,-2.92,0,-2.92
6,6,1,0,-2.92,0,-2.92
7,7,1,0,-2.92,0,-2.92
8,8,1,0,-2.92,0,-2.92
9,9,1,0,-2.92,0,-2.92
10,10,1,0,-2.92,0,-2.92
11,11,1,0,-2.92,0,-2.92
12,12,1,0,-2.92,0,-2.92
13,13,1,0,-2.92,0,-2.92
14,14,1,0,-2.92,0,-2.92
15,15,1,0,-2.92,0,-2.92
16,16,1,0,-2.92,0,-2.92
17,17,1,0,-2.92,0,-2.92
18,18,1,0,-2.92,0,-2.92
19,19,1,0,-2.92,0,-2.92
20,20,1,0,-2.92,0,-2.92
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11

```
0.01,0.01,0.01,60,120.0,6,6
1,12,2,0,1,11,3,-0.6
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

6. BEAM 6

```
BEAM 6.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,4,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
0.2,-1.0625,-5.0
0.2,1.0625,-5.0
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
```

3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.2375,0.,44.8875,0
1,1,1,0,-3.25,0,-3.25
2,2,1,0,-3.25,0,-3.25
3,3,1,0,-3.25,0,-3.25
4,4,1,0,-3.25,0,-3.25
5,5,1,0,-3.25,0,-3.25
6,6,1,0,-3.25,0,-3.25
7,7,1,0,-3.25,0,-3.25
8,8,1,0,-3.25,0,-3.25
9,9,1,0,-3.25,0,-3.25
10,10,1,0,-3.25,0,-3.25
11,11,1,0,-3.25,0,-3.25
12,12,1,0,-3.25,0,-3.25
13,13,1,0,-3.25,0,-3.25
14,14,1,0,-3.25,0,-3.25
15,15,1,0,-3.25,0,-3.25
16,16,1,0,-3.25,0,-3.25
17,17,1,0,-3.25,0,-3.25
18,18,1,0,-3.25,0,-3.25
19,19,1,0,-3.25,0,-3.25
20,20,1,0,-3.25,0,-3.25
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11

```
0.01,0.01,0.01,100,200,10,10
1,12,2,0,1,11,3,-1
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

7. BEAM 7

```
BEAM 7.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,6,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
0.44,-0.9375,-1.7510
0.44,0.9375,-1.7510
0.44,-0.9375,-4.875
0.44,0.9375,-4.875
1900.0,9100.0,0.0044,0.013,0.036
```

1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.2375,0,44.8875,0
1,1,1,0,-3.25,0,-3.25
2,2,1,0,-3.25,0,-3.25
3,3,1,0,-3.25,0,-3.25
4,4,1,0,-3.25,0,-3.25
5,5,1,0,-3.25,0,-3.25
6,6,1,0,-3.25,0,-3.25
7,7,1,0,-3.25,0,-3.25
8,8,1,0,-3.25,0,-3.25
9,9,1,0,-3.25,0,-3.25
10,10,1,0,-3.25,0,-3.25
11,11,1,0,-3.25,0,-3.25
12,12,1,0,-3.25,0,-3.25
13,13,1,0,-3.25,0,-3.25
14,14,1,0,-3.25,0,-3.25
15,15,1,0,-3.25,0,-3.25
16,16,1,0,-3.25,0,-3.25
17,17,1,0,-3.25,0,-3.25
18,18,1,0,-3.25,0,-3.25
19,19,1,0,-3.25,0,-3.25
20,20,1,0,-3.25,0,-3.25
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09

```
1,10,10,0,3,1,0,0,0
11
0.01,0.01,0.01,70,140,7,7
1,12,2,0,1,11,3,-0.7
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

8. BEAM 8

```
BEAM 8.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,4,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
0.31,-1.4934,-4.9375
0.31,1.4934,-4.9375
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
```

```
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.2375,0,44.8875,0
1,1,1,0,-3.25,0,-3.25
2,2,1,0,-3.25,0,-3.25
3,3,1,0,-3.25,0,-3.25
4,4,1,0,-3.25,0,-3.25
5,5,1,0,-3.25,0,-3.25
6,6,1,0,-3.25,0,-3.25
7,7,1,0,-3.25,0,-3.25
8,8,1,0,-3.25,0,-3.25
9,9,1,0,-3.25,0,-3.25
10,10,1,0,-3.25,0,-3.25
11,11,1,0,-3.25,0,-3.25
12,12,1,0,-3.25,0,-3.25
13,13,1,0,-3.25,0,-3.25
14,14,1,0,-3.25,0,-3.25
15,15,1,0,-3.25,0,-3.25
16,16,1,0,-3.25,0,-3.25
17,17,1,0,-3.25,0,-3.25
18,18,1,0,-3.25,0,-3.25
19,19,1,0,-3.25,0,-3.25
20,20,1,0,-3.25,0,-3.25
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
```

```
0.01,0.01,0.01,50,100,5,5
1,12,2,0,1,11,3,-0.5
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

9. BEAM 9

BEAM 9.4
21,2,20,1,1,1,1,1,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,4,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.049,-1.1875,4.9375
0.049,1.1875,4.9375
0.44,-0.9316,-4.3550
0.44,0.9316,-4.3550
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0

3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
1,1,20,5,248.94775,0.0,0.0,10
248.9474,0.0089,262.86571,0.0126,266.2381,0.0154,267.8495,0.0256,268.2609,0.
03
1,1,20,2,0.1375,0,25.9875,0
1,1,1,0,-3.25,0,-3.25
2,2,1,0,-3.25,0,-3.25
3,3,1,0,-3.25,0,-3.25
4,4,1,0,-3.25,0,-3.25
5,5,1,0,-3.25,0,-3.25
6,6,1,0,-3.25,0,-3.25
7,7,1,0,-3.25,0,-3.25
8,8,1,0,-3.25,0,-3.25
9,9,1,0,-3.25,0,-3.25
10,10,1,0,-3.25,0,-3.25
11,11,1,0,-3.25,0,-3.25
12,12,1,0,-3.25,0,-3.25
13,13,1,0,-3.25,0,-3.25
14,14,1,0,-3.25,0,-3.25
15,15,1,0,-3.25,0,-3.25
16,16,1,0,-3.25,0,-3.25
17,17,1,0,-3.25,0,-3.25
18,18,1,0,-3.25,0,-3.25
19,19,1,0,-3.25,0,-3.25
20,20,1,0,-3.25,0,-3.25
-6.0,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11

```
0.01,0.01,0.01,50,100,5,5
1,12,2,0,1,11,3,-0.5
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

10. BEAM 10

```
BEAM 10.4
21,2,20,1,1,1,1,1,0,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,2,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.31,-0.9921,-3.0
0.31,0.9921,-3.0
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
```

```
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
-6.0,0.145,4.0,0.85,1.0,0.60,0.35,1.865,-0.006
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
0.01,0.01,0.01,5,10,0.5,0.5
1,18,2,0,1,11,3,-0.05
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.1
10,1.,1.,0.1
11,1.,1.,0.1
12,1.,1.,0.1
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.1
```

11. BEAM 11

```
BEAM 11.4
21,2,20,1,1,1,1,1,0,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,2,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.31,-0.9296,-3.56
0.31,0.9296,-3.56
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
```

```
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
-6.0,0.145,4.0,0.85,1.0,0.60,0.35,1.865,-0.006
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
0.01,0.01,0.01,8,16,0.8,0.8
1,12,2,0,1,11,3,-0.08
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

12. BEAM12

```
BEAM 10.4
21,2,20,1,1,1,1,1,0,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,6.0,0.0,0.0
3,12.0,0.0,0.0
4,18.0,0.0,0.0
5,24.0,0.0,0.0
6,30.0,0.0,0.0
7,36.0,0.0,0.0
8,42.0,0.0,0.0
9,48.0,0.0,0.0
10,54.0,0.0,0.0
11,60.0,0.0,0.0
12,66.0,0.0,0.0
13,72.0,0.0,0.0
14,78.0,0.0,0.0
15,84.0,0.0,0.0
16,90.0,0.0,0.0
17,96.0,0.0,0.0
18,102.0,0.0,0.0
19,108.0,0.0,0.0
20,114.0,0.0,0.0
21,120.0,0.0,0.0
2,7,0.0,0.0,6.0,1.0,0.0,6.0,0.0,1.0
20,115,0.0,0.0,114.0,1.0,0.0,114.0,0.0,1.0
2,1.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
20,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0,1.0E+10
1,10,10,2,10,6.0,6.0,-6.0,-6.0,240.0
1,1,10,1
2,1,10,1
3,4,7,1
4,4,7,1
5,4,7,1
6,4,7,1
7,4,7,1
8,4,7,1
9,4,7,1
10,4,7,1
0.2,-0.9296,-4.41
0.2,0.9296,-4.41
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
```

```
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
9,9,10,1,1,0.0,0.0,1.0
10,10,11,1,1,0.0,0.0,1.0
11,11,12,1,1,0.0,0.0,1.0
12,12,13,1,1,0.0,0.0,1.0
13,13,14,1,1,0.0,0.0,1.0
14,14,15,1,1,0.0,0.0,1.0
15,15,16,1,1,0.0,0.0,1.0
16,16,17,1,1,0.0,0.0,1.0
17,17,18,1,1,0.0,0.0,1.0
18,18,19,1,1,0.0,0.0,1.0
19,19,20,1,1,0.0,0.0,1.0
20,20,21,1,1,0.0,0.0,1.0
-6.0,0.145,4.0,0.85,1.0,0.60,0.35,1.865,-0.006
29000.0,391.0,60.0,0.09
1,10,10,0,3,1,0,0,0
11
0.01,0.01,0.01,10,20,1,1
1,12,2,0,1,11,3,-0.1
8,0.,0.,-1,0.,0.,0.
14,0.,0.,-1,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
```

LAMPIRAN C
INPUT MODEL

A BEBAN MONOTOMIC

1. BEAM 1 (PP2R3-3)

```
PP2R3-3
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.12,-1.8588,-3.5
0.12,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,1,8,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
```

```
187,0.01
1,1,8,1,0.06,8.28,0,0
1,1,1,0,-1.75,0,-1.75
2,2,1,0,-1.75,0,-1.75
3,3,1,0,-1.75,0,-1.75
4,4,1,0,-1.75,0,-1.75
5,5,1,0,-1.75,0,-1.75
6,6,1,0,-1.75,0,-1.75
7,7,1,0,-1.75,0,-1.75
8,8,1,0,-1.75,0,-1.75
-6.26,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,428.0,52.35,0.09
1,10,10,0,3,1,0,0,0
8
0.2,0.2,0.01,50,100,5,5
1,22,1,0,1,9,3,-0.5
6,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.001
14,1.,1.,0.001
15,1.,1.,0.001
16,1.,1.,0.001
17,1.,1.,0.001
18,1.,1.,0.001
19,1.,1.,0.001
20,1.,1.,0.001
21,1.,1.,0.001
22,1.,1.,0.001
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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2. BEAM 2 (PP2R3-0)

```
PP2R3-0
9,2,8,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.12,-1.8588,-3.5
0.12,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,1,8,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,8,1,0.06,8.16,0,0
1,1,1,0,-1.75,0,-1.75
2,2,1,0,-1.75,0,-1.75
```

```
3,3,1,0,-1.75,0,-1.75
4,4,1,0,-1.75,0,-1.75
5,5,1,0,-1.75,0,-1.75
6,6,1,0,-1.75,0,-1.75
7,7,1,0,-1.75,0,-1.75
8,8,1,0,-1.75,0,-1.75
-6.35,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,553.0,41.32,0.09
1,10,10,0,3,1,0,0,0
8
0.1,0.1,0.01,50,100,5,5
1,22,1,0,1,9,3,-0.5
9,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.1
19,1.,1.,0.05
20,1.,1.,0.05
21,1.,1.,0.05
22,1.,1.,0.05
```

3. BEAM 3 (PP3R3-3)

```
PP3R3-3
9,2,8,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.175,-1.8588,-3.5
0.175,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,2,16,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,8,1,0.06,7.68,0,0
2,1,8,1,0.06,7.68,0,0
1,1,1,2,-1.75,2,-1.75
```

```
2,2,1,2,-1.75,2,-1.75
3,3,1,2,-1.75,2,-1.75
4,4,1,2,-1.75,2,-1.75
5,5,1,2,-1.75,2,-1.75
6,6,1,2,-1.75,2,-1.75
7,7,1,2,-1.75,2,-1.75
8,8,1,2,-1.75,2,-1.75
9,1,2,-2,-1.75,-2,-1.75
10,2,2,-2,-1.75,-2,-1.75
11,3,2,-2,-1.75,-2,-1.75
12,4,2,-2,-1.75,-2,-1.75
13,5,2,-2,-1.75,-2,-1.75
14,6,2,-2,-1.75,-2,-1.75
15,7,2,-2,-1.75,-2,-1.75
16,8,2,-2,-1.75,-2,-1.75
-6.26,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,298.0,64.59,0.09
1,10,10,0,3,1,0,0,0
8
0.2,0.2,0.01,50,100,5,5
1,22,1,0,1,9,3,-0.5
6,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.001
19,1.,1.,0.001
20,1.,1.,0.001
21,1.,1.,0.001
22,1.,1.,0.001
```

4. BEAM 4

```
PP3R3-0
9,2,8,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.175,-1.8588,-3.5
0.175,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,2,16,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,8,1,0.06,7.8,0,0
2,1,8,1,0.06,7.8,0,0
1,1,1,2,-1.75,2,-1.75
```

```
2,2,1,2,-1.75,2,-1.75
3,3,1,2,-1.75,2,-1.75
4,4,1,2,-1.75,2,-1.75
5,5,1,2,-1.75,2,-1.75
6,6,1,2,-1.75,2,-1.75
7,7,1,2,-1.75,2,-1.75
8,8,1,2,-1.75,2,-1.75
9,1,2,-2,-1.75,-2,-1.75
10,2,2,-2,-1.75,-2,-1.75
11,3,2,-2,-1.75,-2,-1.75
12,4,2,-2,-1.75,-2,-1.75
13,5,2,-2,-1.75,-2,-1.75
14,6,2,-2,-1.75,-2,-1.75
15,7,2,-2,-1.75,-2,-1.75
16,8,2,-2,-1.75,-2,-1.75
-5.66,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,200.0,74.88,0.09
1,10,10,0,3,1,0,0,0
8
0.1,0.1,0.01,50,100,5,5
1,22,1,0,1,9,3,-0.5
9,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.1
19,1.,1.,0.05
20,1.,1.,0.05
21,1.,1.,0.05
22,1.,1.,0.05
```

5. BEAM 5 (P1R3-3)

P1R3-3
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-3.5
0.044,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,1,8,4,151,0.0,0.0,10
120,0.004
151,0.005
186,0.007
203,0.01
1,1,8,1,0.03,4.41,0,0
1,1,1,0,-1.75,0,-1.75
2,2,1,0,-1.75,0,-1.75

```
3,3,1,0,-1.75,0,-1.75
4,4,1,0,-1.75,0,-1.75
5,5,1,0,-1.75,0,-1.75
6,6,1,0,-1.75,0,-1.75
7,7,1,0,-1.75,0,-1.75
8,8,1,0,-1.75,0,-1.75
-6.44,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.0,40,0.09
1,10,10,0,3,1,0,0,0
8
0.2,0.2,0.01,50,100,5,5
1,22,1,0,1,9,3,-0.5
6,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.1
19,1.,1.,0.05
20,1.,1.,0.05
21,1.,1.,0.05
22,1.,1.,0.05
```

6. BEAM 6 (P1R3-0)

```
PP2R3-3
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-3.5
0.044,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,1,8,4,151,0.0,0.0,10
120,0.004
151,0.005
186,0.007
203,0.01
1,1,8,1,0.03,4.32,0,0
1,1,1,0,-1.75,0,-1.75
2,2,1,0,-1.75,0,-1.75
```

```
3,3,1,0,-1.75,0,-1.75
4,4,1,0,-1.75,0,-1.75
5,5,1,0,-1.75,0,-1.75
6,6,1,0,-1.75,0,-1.75
7,7,1,0,-1.75,0,-1.75
8,8,1,0,-1.75,0,-1.75
-6.05,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.0,40,0.09
1,10,10,0,3,1,0,0,0
8
0.001,0.001,0.01,75,150,0.75,0.75
1,22,1,0,1,9,3,-0.075
9,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.1
19,1.,1.,0.05
20,1.,1.,0.05
21,1.,1.,0.05
22,1.,1.,0.05
```

7. BEAM 7 (P2R3-3)

```
P2R3-3
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-3.5
0.044,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,2,16,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,8,1,0.06,7.47,0,0
2,1,8,1,0.06,7.47,0,0
1,1,1,2,-1.75,2,-1.75
```

```
2,2,1,2,-1.75,2,-1.75
3,3,1,2,-1.75,2,-1.75
4,4,1,2,-1.75,2,-1.75
5,5,1,2,-1.75,2,-1.75
6,6,1,2,-1.75,2,-1.75
7,7,1,2,-1.75,2,-1.75
8,8,1,2,-1.75,2,-1.75
9,1,2,-2,-1.75,-2,-1.75
10,2,2,-2,-1.75,-2,-1.75
11,3,2,-2,-1.75,-2,-1.75
12,4,2,-2,-1.75,-2,-1.75
13,5,2,-2,-1.75,-2,-1.75
14,6,2,-2,-1.75,-2,-1.75
15,7,2,-2,-1.75,-2,-1.75
16,8,2,-2,-1.75,-2,-1.75
-6.8,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.0,40,0.09
1,10,10,0,3,1,0,0,0
8
0.01,0.01,0.001,35,70,3.5,3.5
1,22,1,0,1,9,3,-0.35
6,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
13,1.,1.,0.1
14,1.,1.,0.1
15,1.,1.,0.1
16,1.,1.,0.1
17,1.,1.,0.1
18,1.,1.,0.1
19,1.,1.,0.05
20,1.,1.,0.05
21,1.,1.,0.05
22,1.,1.,0.05
```

8. BEAM 8 (P2R3-0)

P2R3-0
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-3.5
0.044,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,2,16,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,8,1,0.06,7.59,0,0
2,1,8,1,0.06,7.59,0,0
1,1,1,2,-1.75,2,-1.75

```
2,2,1,2,-1.75,2,-1.75
3,3,1,2,-1.75,2,-1.75
4,4,1,2,-1.75,2,-1.75
5,5,1,2,-1.75,2,-1.75
6,6,1,2,-1.75,2,-1.75
7,7,1,2,-1.75,2,-1.75
8,8,1,2,-1.75,2,-1.75
9,1,2,-2,-1.75,-2,-1.75
10,2,2,-2,-1.75,-2,-1.75
11,3,2,-2,-1.75,-2,-1.75
12,4,2,-2,-1.75,-2,-1.75
13,5,2,-2,-1.75,-2,-1.75
14,6,2,-2,-1.75,-2,-1.75
15,7,2,-2,-1.75,-2,-1.75
16,8,2,-2,-1.75,-2,-1.75
-5.6,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.0,40,0.09
1,10,10,0,3,1,0,0,0
8
0.01,0.01,0.001,10,20,1,1
1,12,1,0,1,9,3,-0.125
9,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
```

9. BEAM 9 (P3R3-3)

```
P3R3-3
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-3.5
0.044,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,3,24,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,8,1,0.06,7.65,0,0
2,1,8,1,0.06,7.65,0,0
3,1,8,1,0.06,7.65,0,0
```

```
1,1,1,2,-1.75,2,-1.75
2,2,1,2,-1.75,2,-1.75
3,3,1,2,-1.75,2,-1.75
4,4,1,2,-1.75,2,-1.75
5,5,1,2,-1.75,2,-1.75
6,6,1,2,-1.75,2,-1.75
7,7,1,2,-1.75,2,-1.75
8,8,1,2,-1.75,2,-1.75
9,1,2,0,-1.75,0,-1.75
10,2,2,0,-1.75,0,-1.75
11,3,2,0,-1.75,0,-1.75
12,4,2,0,-1.75,0,-1.75
13,5,2,0,-1.75,0,-1.75
14,6,2,0,-1.75,0,-1.75
15,7,2,0,-1.75,0,-1.75
16,8,2,0,-1.75,0,-1.75
17,1,3,-2,-1.75,-2,-1.75
18,2,3,-2,-1.75,-2,-1.75
19,3,3,-2,-1.75,-2,-1.75
20,4,3,-2,-1.75,-2,-1.75
21,5,3,-2,-1.75,-2,-1.75
22,6,3,-2,-1.75,-2,-1.75
23,7,3,-2,-1.75,-2,-1.75
24,8,3,-2,-1.75,-2,-1.75
-6.75,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.0,40,0.09
1,10,10,0,3,1,0,0,0
8
0.01,0.01,0.001,50,100,5,5
1,12,1,0,1,9,3,-0.5
6,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

10. BEAM 10 (P3R3-0)

```
P3R3-0
9,2,8,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,16.0,0.0,0.0
4,24.0,0.0,0.0
5,32.0,0.0,0.0
6,44.0,0.0,0.0
7,48.0,0.0,0.0
8,56.0,0.0,0.0
9,64.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
9,65.0,0.0,0.0,64.0,1.0,0.0,64.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
9,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,4.5,-2.5,-4.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-3.5
0.044,1.8588,-3.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
7,7,8,1,1,0.0,0.0,1.0
8,8,9,1,1,0.0,0.0,1.0
1,3,24,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,8,1,0.06,7.35,0,0
2,1,8,1,0.06,7.35,0,0
3,1,8,1,0.06,7.35,0,0
```

```
1,1,1,2,-1.75,2,-1.75
2,2,1,2,-1.75,2,-1.75
3,3,1,2,-1.75,2,-1.75
4,4,1,2,-1.75,2,-1.75
5,5,1,2,-1.75,2,-1.75
6,6,1,2,-1.75,2,-1.75
7,7,1,2,-1.75,2,-1.75
8,8,1,2,-1.75,2,-1.75
9,1,2,0,-1.75,0,-1.75
10,2,2,0,-1.75,0,-1.75
11,3,2,0,-1.75,0,-1.75
12,4,2,0,-1.75,0,-1.75
13,5,2,0,-1.75,0,-1.75
14,6,2,0,-1.75,0,-1.75
15,7,2,0,-1.75,0,-1.75
16,8,2,0,-1.75,0,-1.75
17,1,3,-2,-1.75,-2,-1.75
18,2,3,-2,-1.75,-2,-1.75
19,3,3,-2,-1.75,-2,-1.75
20,4,3,-2,-1.75,-2,-1.75
21,5,3,-2,-1.75,-2,-1.75
22,6,3,-2,-1.75,-2,-1.75
23,7,3,-2,-1.75,-2,-1.75
24,8,3,-2,-1.75,-2,-1.75
-5.98,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.0,40,0.09
1,10,10,0,3,1,0,0,0
8
0.01,0.01,0.001,50,100,5,5
1,12,1,0,1,9,3,-0.5
9,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

11. BEAM 11 (PP1R2-3)

PP1R2-3
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.12,-1.8588,-4.5
0.12,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,1,6,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.5,0,0
1,1,1,0,-2.75,0,-2.75
2,2,1,0,-2.75,0,-2.75
3,3,1,0,-2.75,0,-2.75
4,4,1,0,-2.75,0,-2.75
5,5,1,0,-2.75,0,-2.75
6,6,1,0,-2.75,0,-2.75

```
-6.12,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,67.738,84.6,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,5,10,2.5,2.5
1,12,1,0,1,7,3,-0.25
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

12. BEAM12 (PP1R2-0)

PP1R2-0
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.12,-1.8588,-4.5
0.12,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,1,6,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.2,0,0
1,1,1,0,-2.75,0,-2.75
2,2,1,0,-2.75,0,-2.75
3,3,1,0,-2.75,0,-2.75
4,4,1,0,-2.75,0,-2.75
5,5,1,0,-2.75,0,-2.75

```
6,6,1,0,-2.75,0,-2.75
-6.08,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,134,80.65,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.01,50,100,5,5
1,12,1,0,1,7,3,-0.35
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

13. BEAM 13 (PP2R2-3)

```
PP2R2-3
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.175,-1.8588,-4.5
0.175,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,2,12,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.65,0,0
2,1,6,1,0.06,7.65,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
5,5,1,2,-2.75,2,-2.75
```

```
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
-6.11,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,396,56.68,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,500,1000,50,50
1,12,1,0,1,7,3,-0.5
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

14. BEAM 14 (PP2R2-0)

PP2R2-0
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.175,-1.8588,-4.5
0.175,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,2,12,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.59,0,0
2,1,6,1,0.06,7.59,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
5,5,1,2,-2.75,2,-2.75

```
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
-5.52,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,363.6364,59.56,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,500,1000,50,50
1,12,1,0,1,7,3,-0.5
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

15. BEAM 15 (PP3R2-3)

```
PP3R2-3
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.24,-1.8588,-4.5
0.24,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.71,0,0
2,1,6,1,0.06,7.71,0,0
3,1,6,1,0.06,7.71,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
```

```
5,5,1,2,-2.75,2,-2.75
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
13,1,3,0,-2.75,0,-2.75
14,2,3,0,-2.75,0,-2.75
15,3,3,0,-2.75,0,-2.75
16,4,3,0,-2.75,0,-2.75
17,5,3,0,-2.75,0,-2.75
18,6,3,0,-2.75,0,-2.75
-6.17,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,44,954,81.87,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,75,150,7.5,7.5
1,12,1,0,1,7,3,-0.75
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

16. BEAM 16 (PP3R2-0)

```
PP3R2-0
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.24,-1.8588,-4.5
0.24,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.98,0,0
2,1,6,1,0.06,7.98,0,0
3,1,6,1,0.06,7.98,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
```

```
5,5,1,2,-2.75,2,-2.75
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
13,1,3,0,-2.75,0,-2.75
14,2,3,0,-2.75,0,-2.75
15,3,3,0,-2.75,0,-2.75
16,4,3,0,-2.75,0,-2.75
17,5,3,0,-2.75,0,-2.75
18,6,3,0,-2.75,0,-2.75
-6.44,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,477.66,80.71,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,75,150,7.5,7.5
1,12,1,0,1,7,3,-0.75
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

17. BEAM 17 (P1R2-3)

```
P1R2-3
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-4.5
0.044,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,2,12,4,151,0.0,0.0,10
120,0.004
151,0.005
186,0.007
203,0.01
1,1,6,1,0.045,6.3,0,0
2,1,6,1,0.045,6.3,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
```

```
5,5,1,2,-2.75,2,-2.75
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
-6.15,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.4092,40,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,75,150,7.5,7.5
1,12,1,0,1,7,3,-0.1
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

18. BEAM 18 (P1R2-0)

```
P1R2-0
7,2,6,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-4.5
0.044,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.04,4.72,0,0
2,1,6,1,0.04,4.72,0,0
3,1,6,1,0.04,4.72,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
```

```
5,5,1,2,-2.75,2,-2.75
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
13,1,3,0,-2.75,0,-2.75
14,2,3,0,-2.75,0,-2.75
15,3,3,0,-2.75,0,-2.75
16,4,3,0,-2.75,0,-2.75
17,5,3,0,-2.75,0,-2.75
18,6,3,0,-2.75,0,-2.75
-6.42,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.4092,40,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,5,10,0.5,0.5
1,12,1,0,1,7,3,-0.05
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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19. BEAM 19 (P2R2-3)

```
P2R2-3
7,2,6,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-4.5
0.044,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.32,0,0
2,1,6,1,0.06,7.32,0,0
3,1,6,1,0.06,7.32,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
```

```
5,5,1,2,-2.75,2,-2.75
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
13,1,3,0,-2.75,0,-2.75
14,2,3,0,-2.75,0,-2.75
15,3,3,0,-2.75,0,-2.75
16,4,3,0,-2.75,0,-2.75
17,5,3,0,-2.75,0,-2.75
18,6,3,0,-2.75,0,-2.75
-6.48,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.4092,40,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,25,50,2.5,2.5
1,12,1,0,1,7,3,-0.25
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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20. BEAM 20 (P2R2-0)

```
P2R2-0
7,2,6,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,5.0,0.0,0.0
3,15.0,0.0,0.0
4,25.0,0.0,0.0
5,38.33,0.0,0.0
6,45.0,0.0,0.0
7,55.0,0.0,0.0
2,6,0.0,0.0,5.0,1.0,0.0,5.0,0.0,1.0
7,56.0,0.0,0.0,55.0,1.0,0.0,55.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,5.5,-2.5,-5.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.044,-1.8588,-4.5
0.044,1.8588,-4.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.26,0,0
2,1,6,1,0.06,7.26,0,0
3,1,6,1,0.06,7.26,0,0
1,1,1,2,-2.75,2,-2.75
2,2,1,2,-2.75,2,-2.75
3,3,1,2,-2.75,2,-2.75
4,4,1,2,-2.75,2,-2.75
```

```
5,5,1,2,-2.75,2,-2.75
6,6,1,2,-2.75,2,-2.75
7,1,2,-2,-2.75,-2,-2.75
8,2,2,-2,-2.75,-2,-2.75
9,3,2,-2,-2.75,-2,-2.75
10,4,2,-2,-2.75,-2,-2.75
11,5,2,-2,-2.75,-2,-2.75
12,6,2,-2,-2.75,-2,-2.75
13,1,3,0,-2.75,0,-2.75
14,2,3,0,-2.75,0,-2.75
15,3,3,0,-2.75,0,-2.75
16,4,3,0,-2.75,0,-2.75
17,5,3,0,-2.75,0,-2.75
18,6,3,0,-2.75,0,-2.75
-6.6,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,251.4092,40,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,25,50,2.5,2.5
1,12,1,0,1,7,3,-0.25
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
```

21. BEAM 21 (PP1R1-3)

PP1R1-3
7,2,6,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,14.0,0.0,0.0
4,24.0,0.0,0.0
5,30.66,0.0,0.0
6,34.0,0.0,0.0
7,44.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
7,45.0,0.0,0.0,44.0,1.0,0.0,44.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,6.5,-2.5,-6.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.175,-1.8588,-5.5
0.175,1.8588,-5.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,1,6,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,6,1,0.06,7.68,0,0
1,1,1,0,-3.75,0,-3.75
2,2,1,0,-3.75,0,-3.75
3,3,1,0,-3.75,0,-3.75
4,4,1,0,-3.75,0,-3.75
5,5,1,0,-3.75,0,-3.75
6,6,1,0,-3.75,0,-3.75

```
-4.88,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,167.0481,76.88,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,30,60,3,3
1,12,1,0,1,7,3,-0.3
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

22. BEAM 22 (PP1R1-0)

```
PP1R1-0
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,14.0,0.0,0.0
4,24.0,0.0,0.0
5,30.66,0.0,0.0
6,34.0,0.0,0.0
7,44.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
7,45.0,0.0,0.0,44.0,1.0,0.0,44.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,6.5,-2.5,-6.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.175,-1.8588,-5.5
0.175,1.8588,-5.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,1,6,4,151,0.0,0.0,10
120,0.004
151,0.005
184.5,0.007
192,0.01
1,1,6,1,0.06,8.1,0,0
1,1,1,0,-3.75,0,-3.75
2,2,1,0,-3.75,0,-3.75
3,3,1,0,-3.75,0,-3.75
4,4,1,0,-3.75,0,-3.75
5,5,1,0,-3.75,0,-3.75
6,6,1,0,-3.75,0,-3.75
```

```
-5,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,134.0206,80.75,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,30,60,3,3
1,12,1,0,1,7,3,-0.3
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

23. BEAM 23 (PP2R1-3)

```
PP2R1-3
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,14.0,0.0,0.0
4,24.0,0.0,0.0
5,30.66,0.0,0.0
6,34.0,0.0,0.0
7,44.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
7,45.0,0.0,0.0,44.0,1.0,0.0,44.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,6.5,-2.5,-6.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.24,-1.8588,-5.5
0.24,1.8588,-5.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,2,12,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,8.16,0,0
2,1,6,1,0.06,8.16,0,0
1,1,1,2,-3.75,2,-3.75
2,2,1,2,-3.75,2,-3.75
3,3,1,2,-3.75,2,-3.75
4,4,1,2,-3.75,2,-3.75
5,5,1,2,-3.75,2,-3.75
```

6,6,1,2,-3.75,2,-3.75
7,1,2,-2,-3.75,-2,-3.75
8,2,2,-2,-3.75,-2,-3.75
9,3,2,-2,-3.75,-2,-3.75
10,4,2,-2,-3.75,-2,-3.75
11,5,2,-2,-3.75,-2,-3.75
12,6,2,-2,-3.75,-2,-3.75
-5.55,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,0,89.3,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,30,60,3,3
1,12,1,0,1,7,3,-0.3
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05

24. BEAM24 (PP2R1-0)

```
PP2R1-0
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,14.0,0.0,0.0
4,24.0,0.0,0.0
5,30.66,0.0,0.0
6,34.0,0.0,0.0
7,44.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
7,45.0,0.0,0.0,44.0,1.0,0.0,44.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,6.5,-2.5,-6.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.24,-1.8588,-5.5
0.24,1.8588,-5.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,2,12,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.8,0,0
2,1,6,1,0.06,7.8,0,0
1,1,1,2,-3.75,2,-3.75
2,2,1,2,-3.75,2,-3.75
3,3,1,2,-3.75,2,-3.75
4,4,1,2,-3.75,2,-3.75
5,5,1,2,-3.75,2,-3.75
```

```
6,6,1,2,-3.75,2,-3.75
7,1,2,-2,-3.75,-2,-3.75
8,2,2,-2,-3.75,-2,-3.75
9,3,2,-2,-3.75,-2,-3.75
10,4,2,-2,-3.75,-2,-3.75
11,5,2,-2,-3.75,-2,-3.75
12,6,2,-2,-3.75,-2,-3.75
-5.73,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,265.6784,68.44,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,30,60,3,3
1,12,1,0,1,7,3,-0.3
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

25. BEAM 25 (PP3R1-3)

PP3R1-3
7,2,6,1,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,14.0,0.0,0.0
4,24.0,0.0,0.0
5,30.66,0.0,0.0
6,34.0,0.0,0.0
7,44.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
7,45.0,0.0,0.0,44.0,1.0,0.0,44.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,6.5,-2.5,-6.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.31,-1.8588,-5.5
0.31,1.8588,-5.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.86,0,0
2,1,6,1,0.06,7.86,0,0
3,1,6,1,0.06,7.86,0,0
1,1,1,2,-3.75,2,-3.75
2,2,1,2,-3.75,2,-3.75
3,3,1,2,-3.75,2,-3.75
4,4,1,2,-3.75,2,-3.75

-

```
5,5,1,2,-3.75,2,-3.75
6,6,1,2,-3.75,2,-3.75
7,1,2,-2,-3.75,-2,-3.75
8,2,2,-2,-3.75,-2,-3.75
9,3,2,-2,-3.75,-2,-3.75
10,4,2,-2,-3.75,-2,-3.75
11,5,2,-2,-3.75,-2,-3.75
12,6,2,-2,-3.75,-2,-3.75
13,1,3,0,-3.75,0,-3.75
14,2,3,0,-3.75,0,-3.75
15,3,3,0,-3.75,0,-3.75
16,4,3,0,-3.75,0,-3.75
17,5,3,0,-3.75,0,-3.75
18,6,3,0,-3.75,0,-3.75
-5.02,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,265.6784,68.14,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,30,60,3,3
1,12,1,0,1,7,3,-0.3
5,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05
```

26. BEAM26 (PP3R1-0)

```
PP3R1-0
7,2,6,1,1,1,1,2,1,28.0,0.0,0.00001
1,0.0,0.0,0.0
2,4.0,0.0,0.0
3,14.0,0.0,0.0
4,24.0,0.0,0.0
5,30.66,0.0,0.0
6,34.0,0.0,0.0
7,44.0,0.0,0.0
2,5,0.0,0.0,4.0,1.0,0.0,4.0,0.0,1.0
7,45.0,0.0,0.0,44.0,1.0,0.0,44.0,0.0,1.0
2,0.0E+10,1.0E+10,1.0E+10,1.0E+10,0E+10,1.0E+10
7,1.0E+10,1.0E+10,0.0E+10,1.0E+10,1.0E+10,1.0E+10
1,10,10,2,10,2.5,6.5,-2.5,-6.5,240.0
1,1,10,1
2,1,10,1
3,1,10,1
4,1,10,1
5,1,10,1
6,1,10,1
7,1,10,1
8,1,10,1
9,1,10,1
10,1,10,1
0.31,-1.8588,-5.5
0.31,1.8588,-5.5
1900.0,9100.0,0.0044,0.013,0.036
1,1,2,1,1,0.0,0.0,1.0
2,2,3,1,1,0.0,0.0,1.0
3,3,4,1,1,0.0,0.0,1.0
4,4,5,1,1,0.0,0.0,1.0
5,5,6,1,1,0.0,0.0,1.0
6,6,7,1,1,0.0,0.0,1.0
1,3,18,4,151,0.0,0.0,10
120,0.004
151,0.005
183,0.007
187,0.01
1,1,6,1,0.06,7.74,0,0
2,1,6,1,0.06,7.74,0,0
3,1,6,1,0.06,7.74,0,0
1,1,1,2,-3.75,2,-3.75
2,2,1,2,-3.75,2,-3.75
3,3,1,2,-3.75,2,-3.75
4,4,1,2,-3.75,2,-3.75
```

5,5,1,2,-3.75,2,-3.75
6,6,1,2,-3.75,2,-3.75
7,1,2,-2,-3.75,-2,-3.75
8,2,2,-2,-3.75,-2,-3.75
9,3,2,-2,-3.75,-2,-3.75
10,4,2,-2,-3.75,-2,-3.75
11,5,2,-2,-3.75,-2,-3.75
12,6,2,-2,-3.75,-2,-3.75
13,1,3,0,-3.75,0,-3.75
14,2,3,0,-3.75,0,-3.75
15,3,3,0,-3.75,0,-3.75
16,4,3,0,-3.75,0,-3.75
17,5,3,0,-3.75,0,-3.75
18,6,3,0,-3.75,0,-3.75
-5.27,0.145,4.0,0.85,0.8,0.33,0.35,1.865,-0.0035
29000.0,265.6784,66.98,0.09
1,10,10,0,3,1,0,0,0
6
0.01,0.01,0.001,30,60,3,3
1,12,1,0,1,7,3,-0.3
7,0.,0.,-10,0.,0.,0.
1,1.,1.,0.1
2,1.,1.,0.1
3,1.,1.,0.1
4,1.,1.,0.1
5,1.,1.,0.1
6,1.,1.,0.1
7,1.,1.,0.1
8,1.,1.,0.1
9,1.,1.,0.05
10,1.,1.,0.05
11,1.,1.,0.05
12,1.,1.,0.05

B BEBAN SEMI SIKLIK

Permodelan untuk beban semi siklik pada load control information

1,10,10,0,3,1,0,0,0
A
0.01,0.01,0.001,E,F,D,D
1,50,1,0,1,B,3,-C
B,0.,0.,-10,0.,0.,0.
1,1.,1.,0.0000001

2,1.,1.,0.11111111111
3,1.,1.,0.11111111111
4,1.,1.,0.11111111111
5,1.,1.,-0.11111111111
6,1.,1.,-0.11111111111
7,1.,1.,-0.11111111111
8,1.,1.,0.22222222222
9,1.,1.,0.22222222222
10,1.,1.,0.22222222222
11,1.,1.,-0.22222222222
12,1.,1.,-0.22222222222
13,1.,1.,-0.22222222222
14,1.,1.,0.33333333333
15,1.,1.,0.33333333333
16,1.,1.,0.33333333333
17,1.,1.,-0.33333333333
18,1.,1.,-0.33333333333
19,1.,1.,-0.33333333333
20,1.,1.,0.33333333333
21,1.,1.,0.33333333333
22,1.,1.,0.33333333333
23,1.,1.,-0.33333333333
24,1.,1.,-0.33333333333
25,1.,1.,-0.33333333333
26,1.,1.,0.33333333333
27,1.,1.,0.33333333333
28,1.,1.,0.33333333333
29,1.,1.,-0.33333333333
30,1.,1.,-0.33333333333
31,1.,1.,-0.33333333333
32,1.,1.,0.33333333333
33,1.,1.,0.33333333333
34,1.,1.,0.33333333333
35,1.,1.,-0.33333333333
36,1.,1.,-0.33333333333
37,1.,1.,-0.33333333333
38,1.,1.,0.33333333333
39,1.,1.,0.33333333333
40,1.,1.,0.33333333333
41,1.,1.,-0.33333333333
42,1.,1.,-0.33333333333
43,1.,1.,-0.33333333333
44,1.,1.,0.25
45,1.,1.,0.25
46,1.,1.,0.25
47,1.,1.,0.10

48,1.,1.,0.5
49,1.,1.,0.5
50,1.,1.,0.5
□□

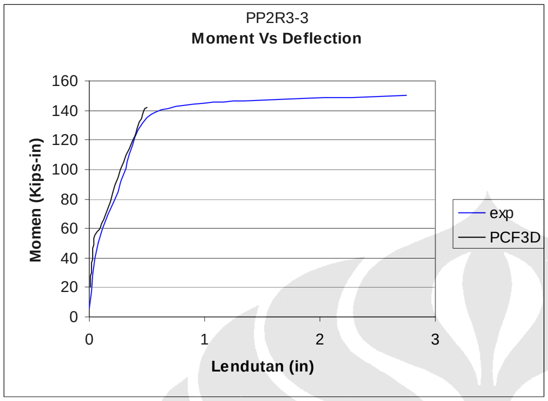
dimana :

- A = *member* pada tengah bentang
- B = *joint* pada tengah bentang
- C = nilai Lendutan maksimum dari hasil running model statik dengan kontrol lendutan
- D = 10 x nilai C
- E = 10 x nilai D
- F = 2 x nilai E

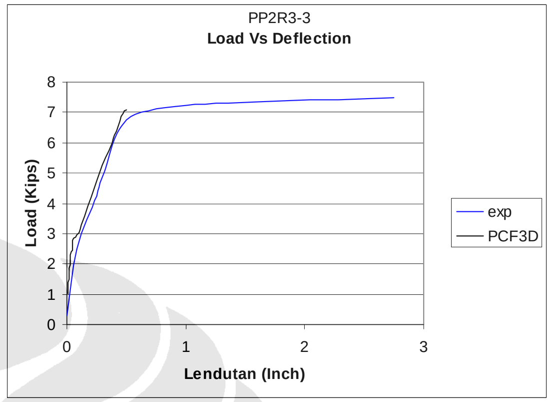
BALOK PP2R3-3

Beban Monotomik

OUPUT



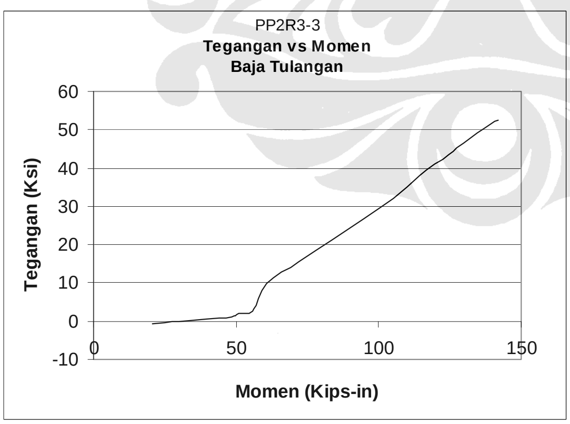
Grafik D.1.1. Momen vs lendutan control beban balok PP2R3-3



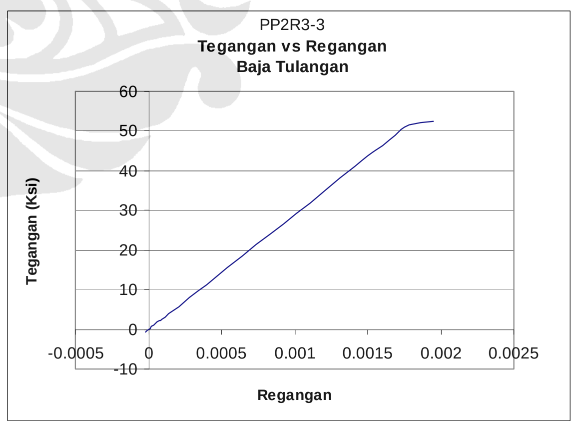
Grafik D.1.2. Beban vs lendutan control beban balok PP2R3-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan. tetapi untuk daerah plastis program tidak berhasil mengeluarkan output yang memuaskan

Tegangan Baja



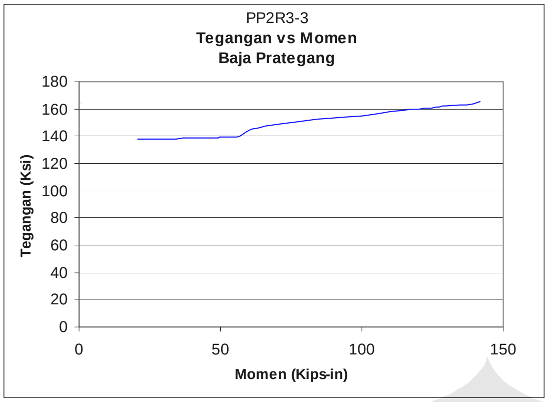
Grafik D.1.3. Tegangan baja tulangan vs momen control beban balok PP2R3-3



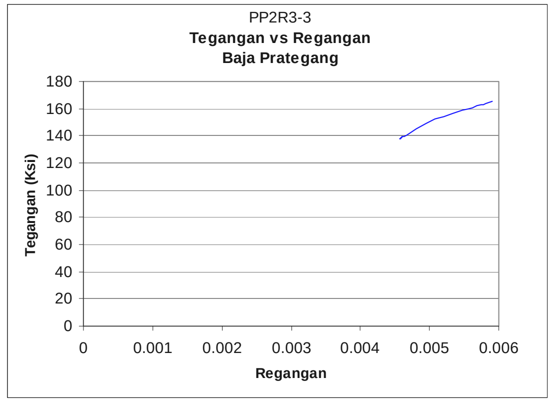
Grafik D.1.4. Tegangan vs regangan baja tulangan control beban balok PP2R3-3

Tegangan baja yang terjadi meningkat sebanding dengan momen yang terjadi. Terlihat bahwa baja tulangan sudah mengalami kelelehan sebelum kehancuran struktur

Tegangan Baja Prategang



Grafik D.1.5. Tegangan baja prategang vs momen control beban balok PP2R3-3



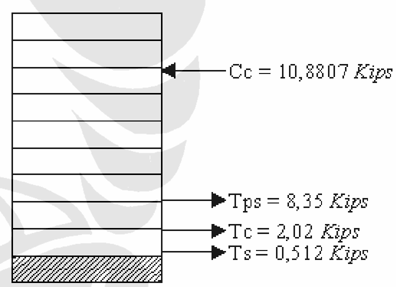
Grafik D.1.6. Tegangan vs regangan baja pratengang control beban balok PP2R3-3

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi.Terlihat bahwa baja prategang sudah mengalami kegagalan leleh sebelum kehancuran struktur

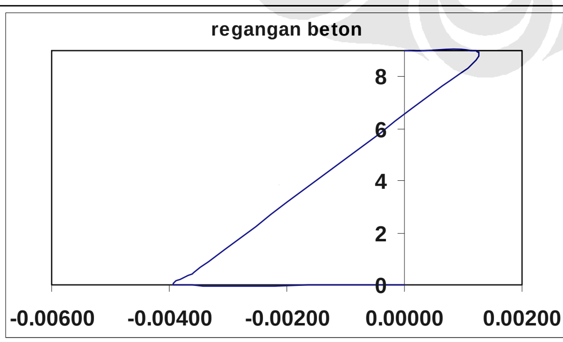
Retak awal Pada beton

P = 2,57 *Kips*

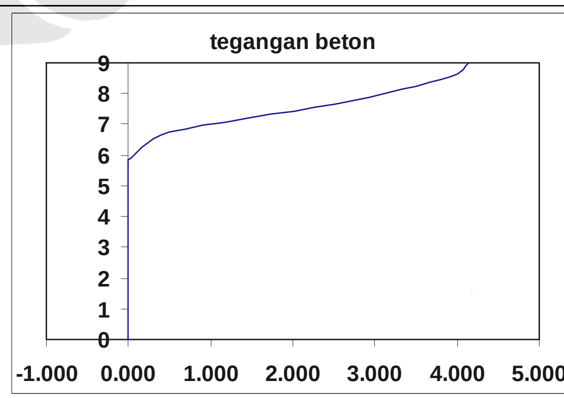
Lendutan = 0,0425 Inch



Gambar D.1. Gaya dalam balok PP2R3-3 pada retak awal



Grafik D.1.7. regangan beton balok PP2R3-3 pada retak awal

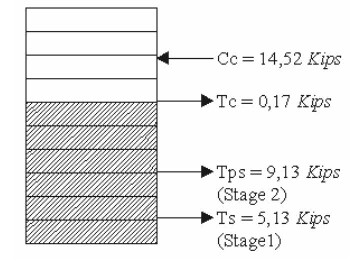


Grafik D.1.8. tegangan beton balok PP2R3-3 pada retak awal

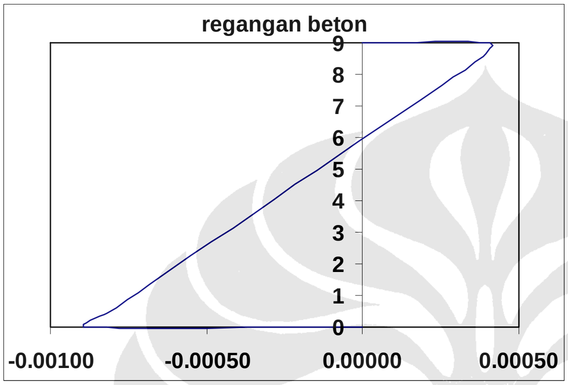
Leleh Pada Baja Prategang

P = 2,57 *Kips*

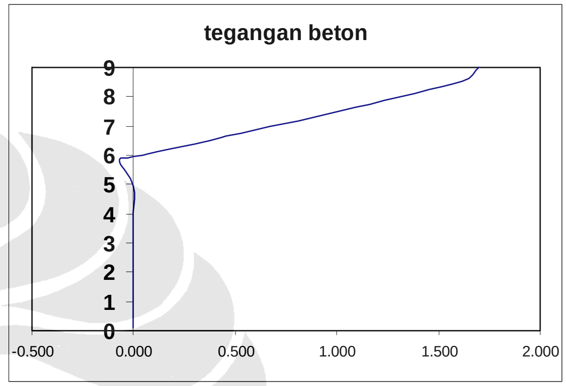
Lendutan = 0,0425 Inch



Gambar D.1.2. Gaya dalam balok PP2R3-3 pada leleh baja prategang



Grafik D.1.9. regangan beton balok PP2R3-3 pada leleh baja prategang

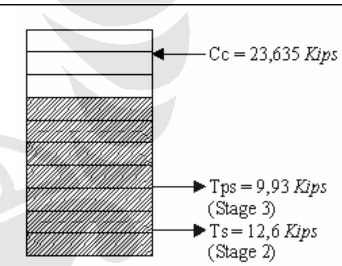


Grafik D.1.10. tegangan beton balok PP2R3-3 pada leleh baja prategang

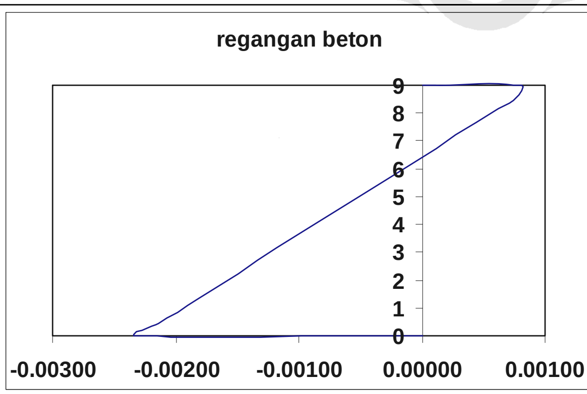
Leleh Pada Baja Tulangan & Ultimate

P = 7,09 *Kips*

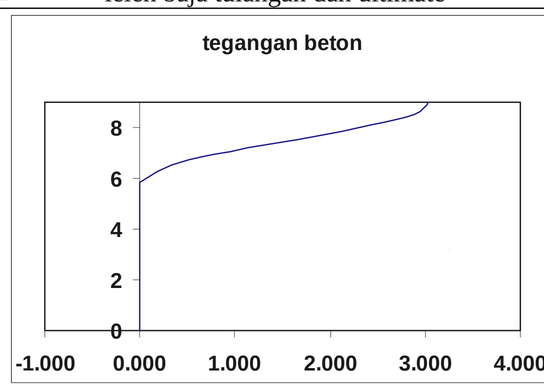
Lendutan = 0,5 Inch



Gambar D.1.3. Gaya dalam balok PP2R3-3 pada leleh baja tulangan dan ultimate

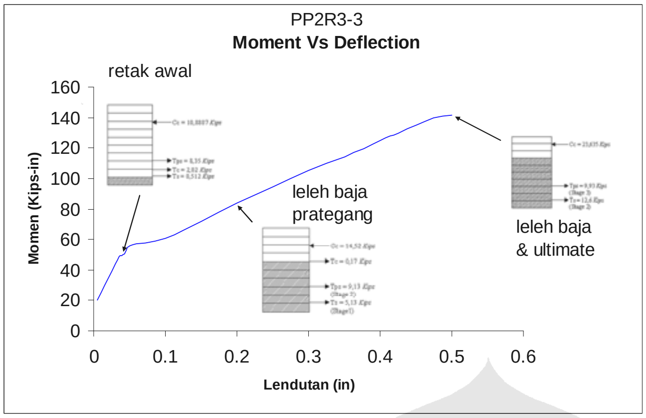


Grafik D.1.11. regangan beton balok PP2R3-3 pada leleh baja tulangan dan ultimate



Grafik D.1.12. tegangan beton balok PP2R3-3 pada leleh baja tulangan dan ultimate

Tahapan Kerusakan Struktur



Grafik D.1.13. Momen vs lendutan tahapan kerusakan struktur balok PP2R3-3

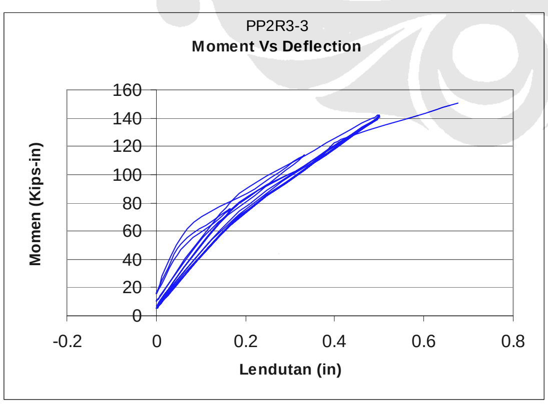
Terlihat bahwa gaya pada saat baja mengalami leleh sama dengan kegagalan dari struktur, dan baja prategang melalui kondisi plastis

Retak pada beton pada saat ultimate

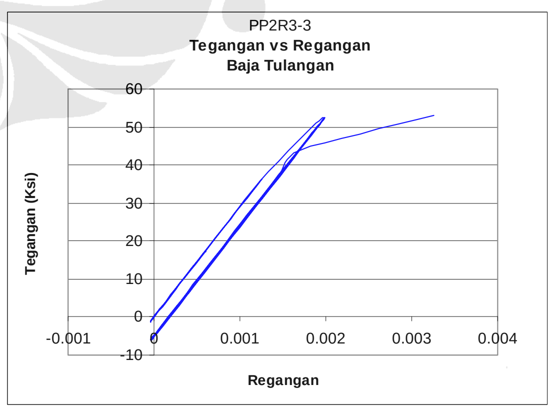
Gambar D.1.4. pola retak saat ultimate pada balok PP2R3-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

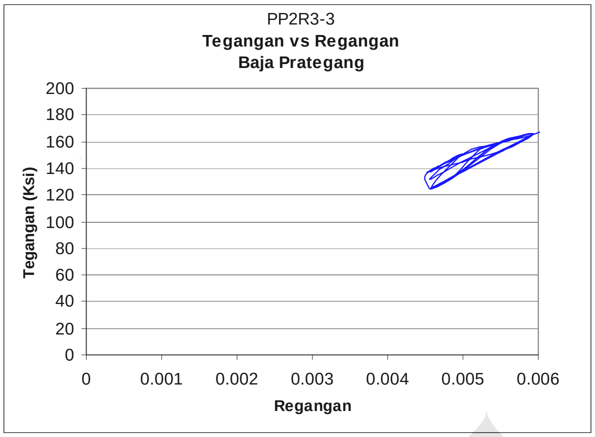
Beban Semi Siklik



Grafik D.1.14. Momen vs lendutan beban semi siklik balok PP2R3-3



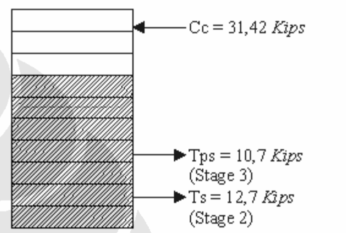
Grafik D.1.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP2R3-3



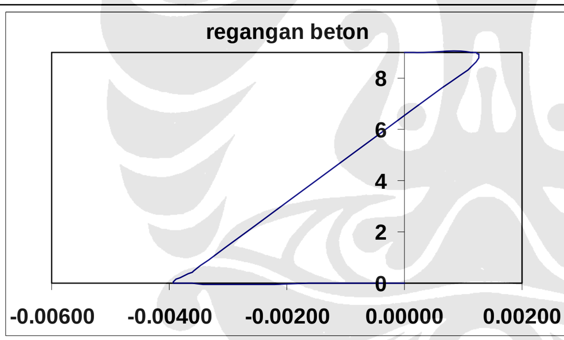
Grafik D.1.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP2R3-3

Kondisi Ultimate

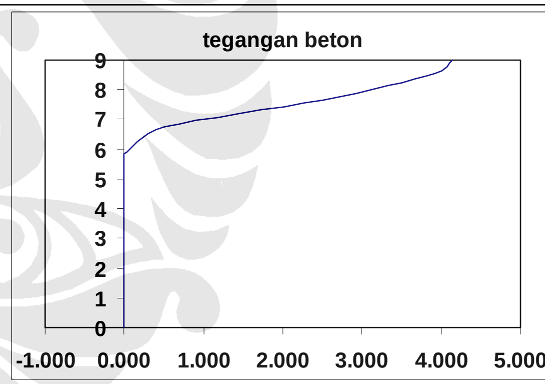
P	=	3,77	*Kips*
Lendutan	=	0,675	*Inch*



Gambar D.1.5. Gaya dalam balok PP2R3-3 pada beban semi siklik



Grafik D.1.17. regangan beton beban semi siklik balok PP2R3-3

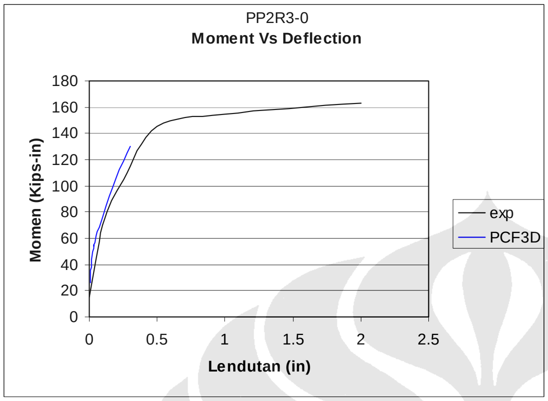


Grafik D.1.18. tegangan beton beban semi siklik balok PP2R3-3

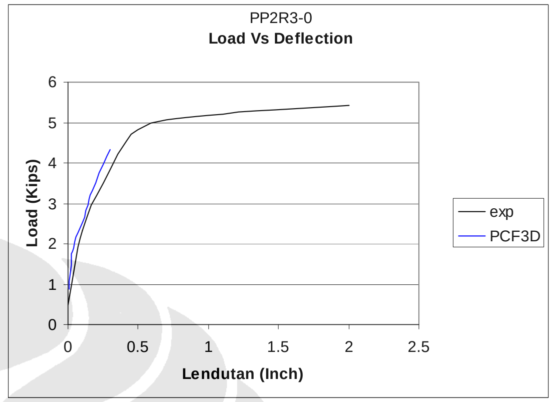
BALOK PP2R3-0

Beban Monotomik

OUPUT



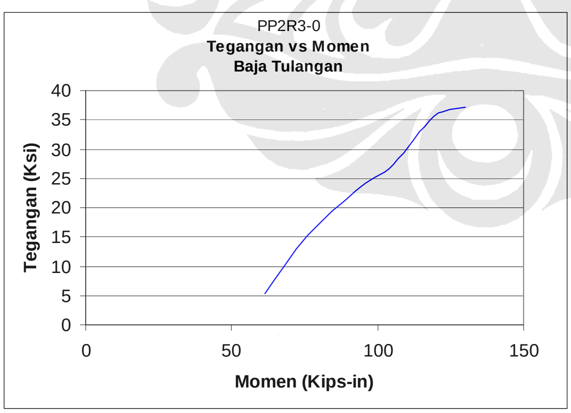
Grafik D.2.1. Momen vs lendutan control beban balok PP2R3-0



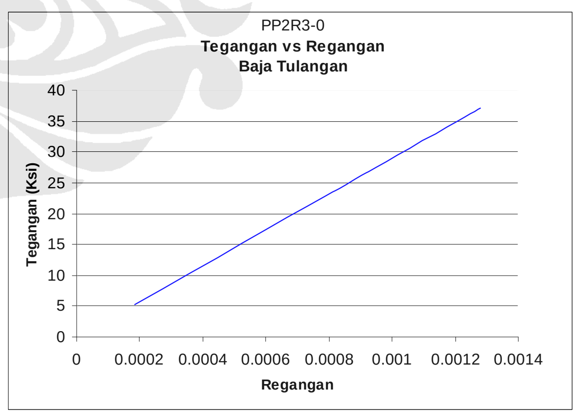
Grafik D.2.2. Beban vs lendutan control beban balok PP2R3-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan. tetapi untuk daerah plastis program tidak berhasil mengeluarkan output yang memuaskan

Tegangan Baja



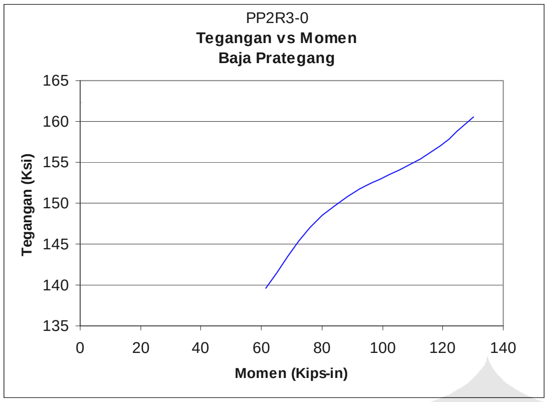
Grafik D.2.3. Tegangan baja tulangan vs momen control beban balok PP2R3-0



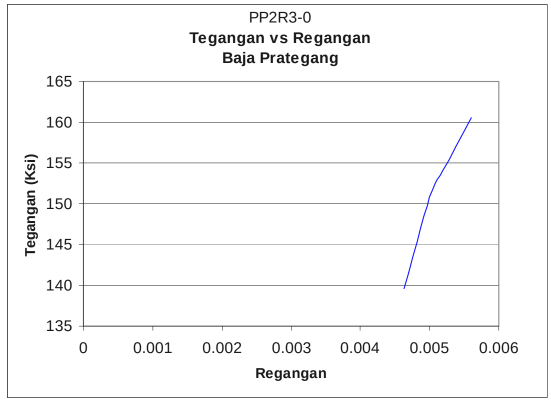
Grafik D.2.4. Tegangan vs regangan baja tulangan control beban balok PP2R3-0

Tegangan baja yang terjadi meningkat sebanding dengan momen yang terjadi. Terlihat bahwa baja tulangan belum mengalami kelelehan sebelum kehancuran struktur

Tegangan Baja Prategang



Grafik D.2.5. Tegangan baja prategang vs momen control beban balok PP2R3-0



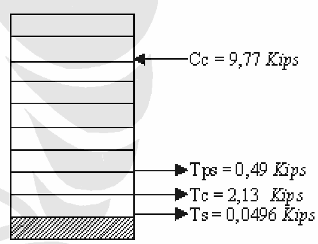
Grafik D.2.6. Tegangan vs regangan baja pratengang control beban balok PP2R3-0

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi.Terlihat bahwa baja prategang sudah mengalami kegagalan leleh sebelum kehancuran struktur

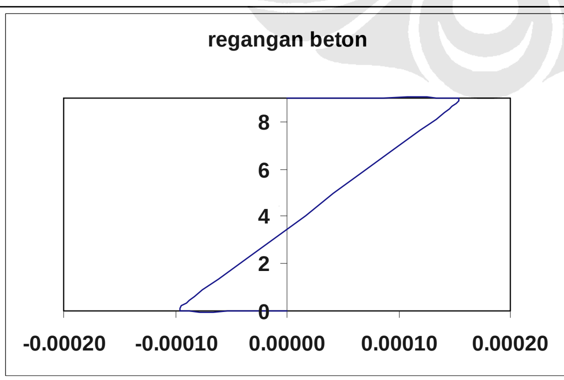
Retak awal Pada beton

P = 1,78 *Kips*

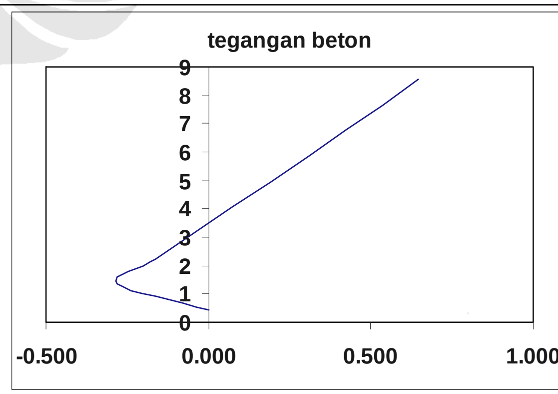
Lendutan = 0,0315 Inch



Gambar D.2.1. Gaya dalam balok PP2R3-0 pada retak awal



Grafik D.2.7. regangan beton balok PP2R3-0 pada retak awal

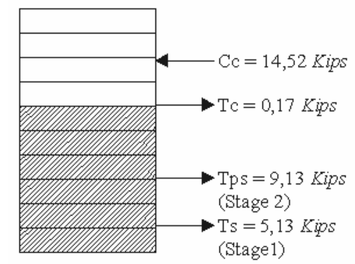


Grafik D.2.8. tegangan beton balok PP2R3-0 pada retak awal

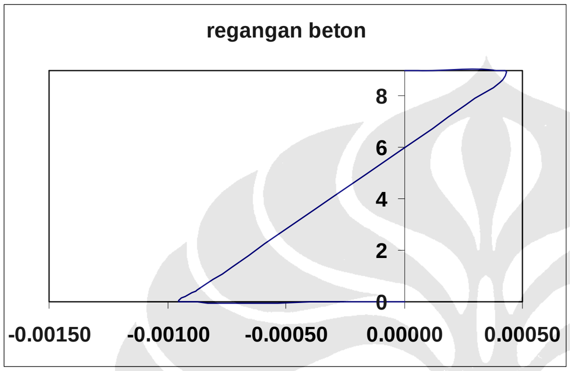
Leleh Pada Baja Prategang

P = 3,08 *Kips*

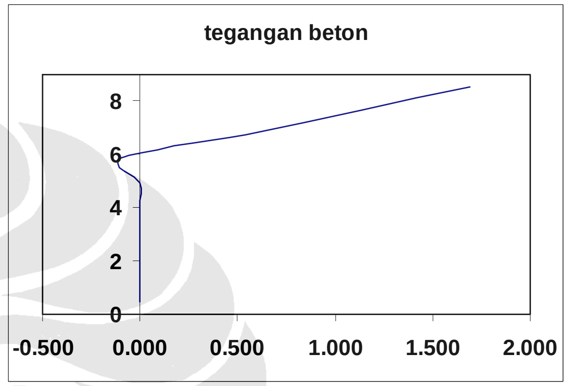
Lendutan = 0,15 Inch



Gambar D.2.2. Gaya dalam balok PP2R3-0 pada leleh baja prategang



Grafik D.2.9. regangan beton balok PP2R3-0 pada leleh baja prategang

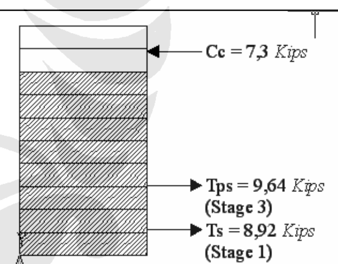


Grafik D.2.10. tegangan beton balok PP2R3-0 pada leleh baja prategang

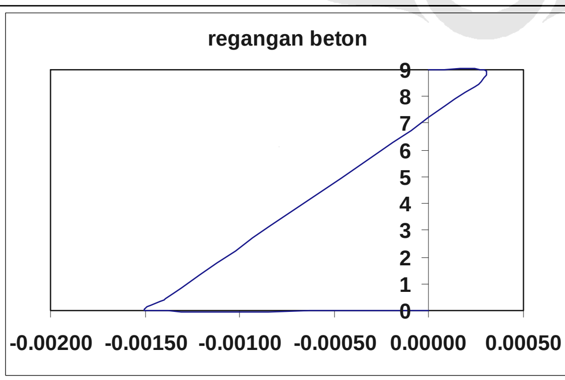
Ultimate

P = 4,34 *Kips*

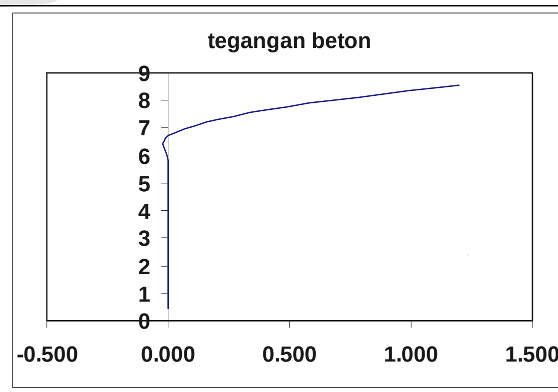
Lendutan = 0,3 Inch



Gambar D.2.3. Gaya dalam balok PP2R3-0 pada ultimate

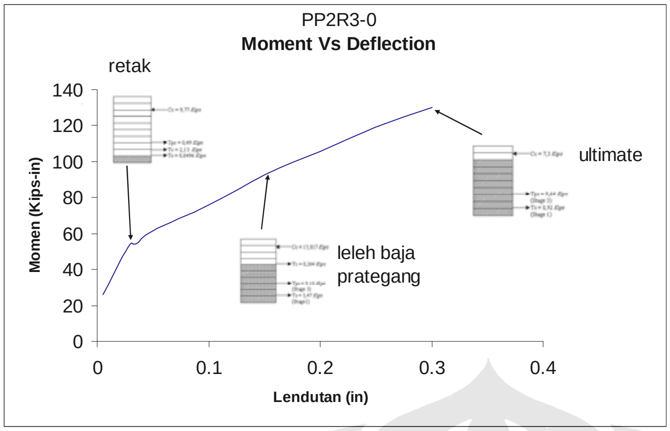


Grafik D.2.11. regangan beton balok PP2R3-0 pada ultimate



Grafik D.2.12. tegangan beton balok PP2R3-0 ultimate

Tahapan Kerusakan Struktur



Grafik D.2.13. Momen vs lendutan tahapan kerusakan struktur balok PP2R3-0

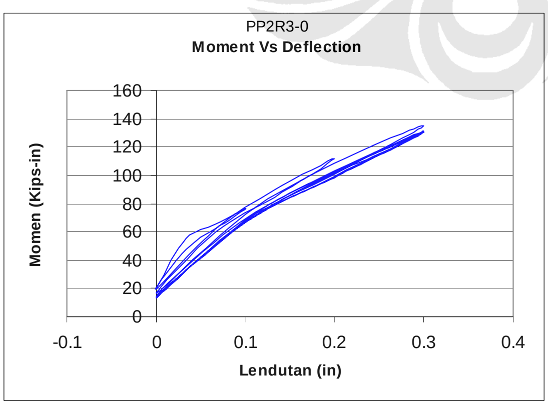
Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang sudah mengalami kelelehan dan kegagalan yang terjadi akibat Matriks kekakuan struktur yang menjadi tidak stabil.

Retak pada beton pada saat ultimate

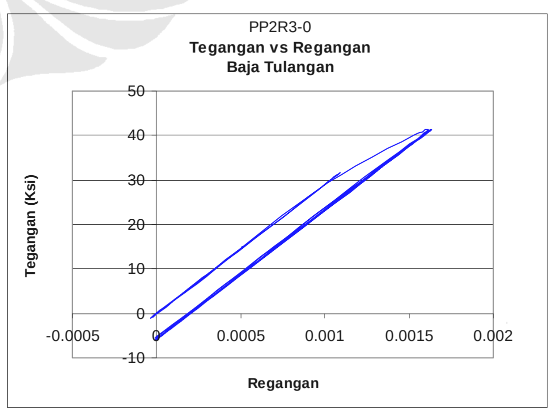
Gambar D.2.4. pola retak saat ultimate pada balok PP2R3-0

terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

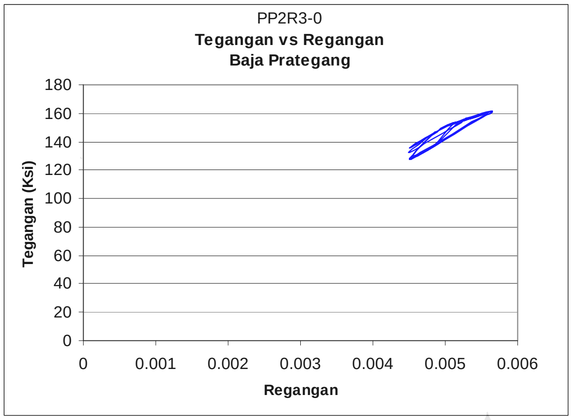
Beban Semi Siklik



Grafik D.2.14. Momen vs lendutan beban semi siklik balok PP2R3-0



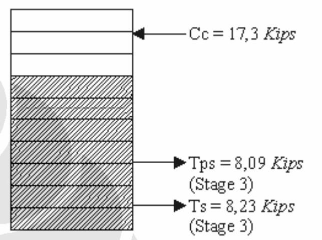
Grafik D.2.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP2R3-0



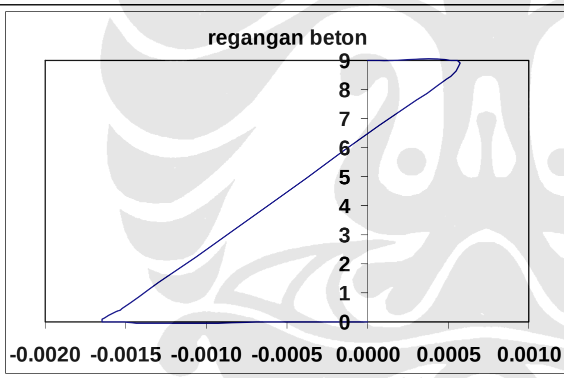
Grafik D.2.16. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP2R3-0

Kondisi Ultimate

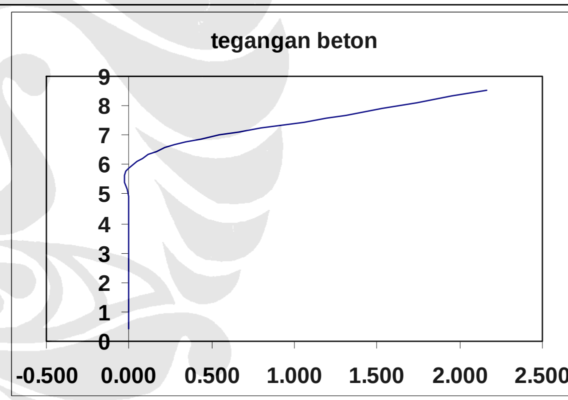
P	=	3,77	*Kips*
Lendutan	=	0,675	*Inch*



Gambar D.2.5. Gaya dalam balok PP2R3-0 pada beban semi siklik



Grafik D.2.17. regangan beton beban semi siklik balok PP2R3-0

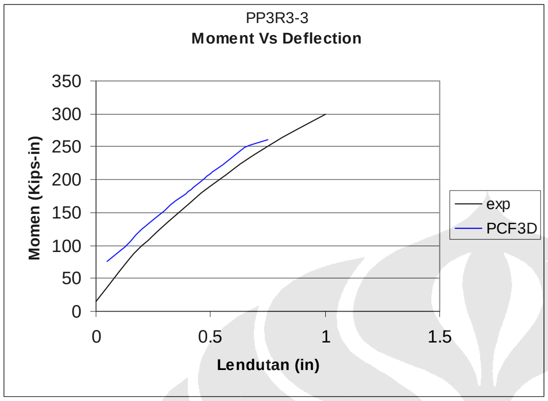


Grafik D.2.18. tegangan beton beban semi siklik balok PP2R3-0

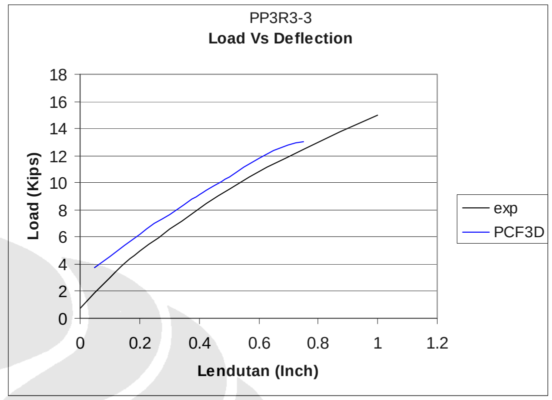
BALOK PP3R3-3

Beban Monotomik

OUPUT



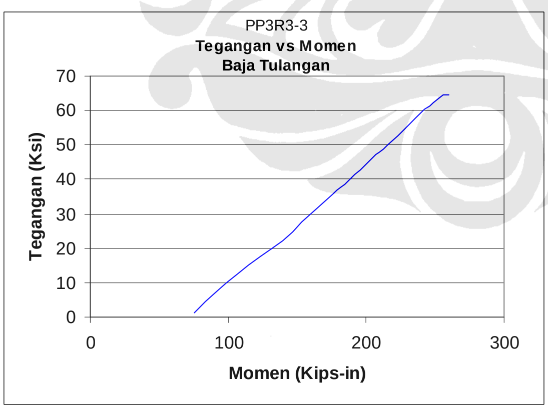
Grafik D.3.1. Momen vs lendutan control beban balok PP3R3-3



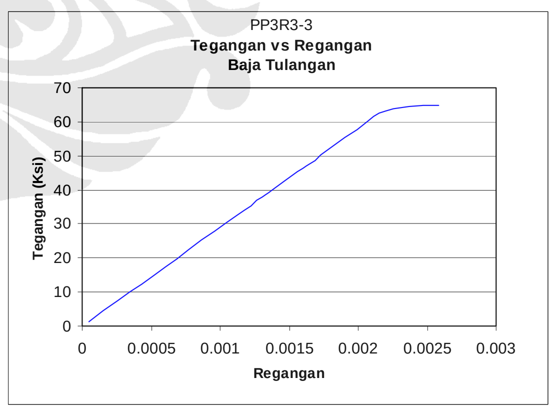
Grafik D.3.2. Beban vs lendutan control beban balok PP3R3-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan. tetapi untuk daerah plastis program tidak berhasil mengeluarkan output yang memuaskan

Tegangan Baja



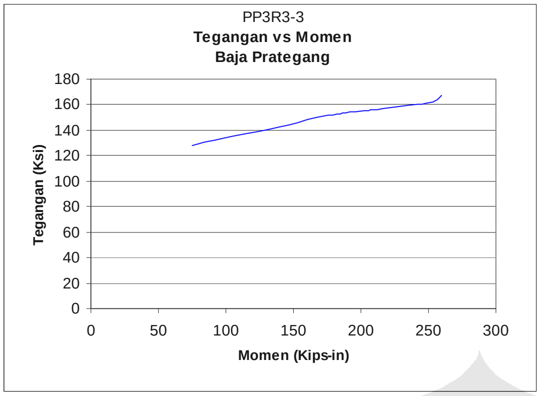
Grafik D.3.3. Tegangan baja tulangan vs momen control beban balok PP3R3-3



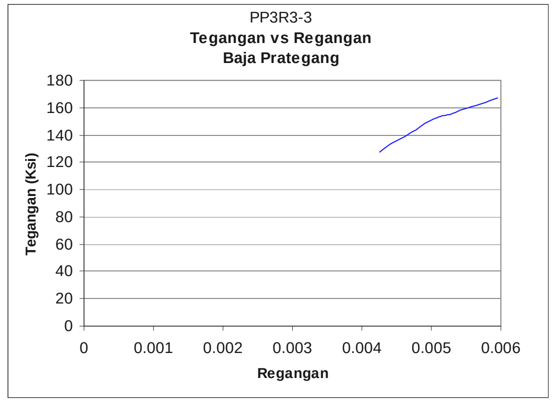
Grafik D.3.4. Tegangan vs regangan baja tulangan control beban balok PP3R3-3

Tegangan baja yang terjadi meningkat sebanding dengan momen yang terjadi. Terlihat bahwa baja tulangan sudah mengalami kelelehan sebelum kehancuran struktur

Tegangan Baja Prategang

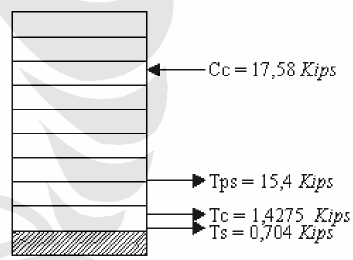
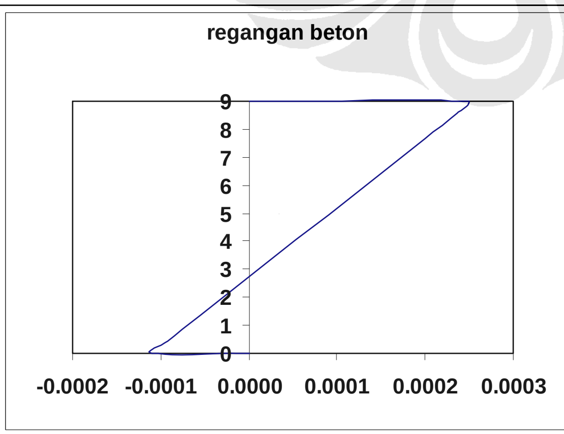
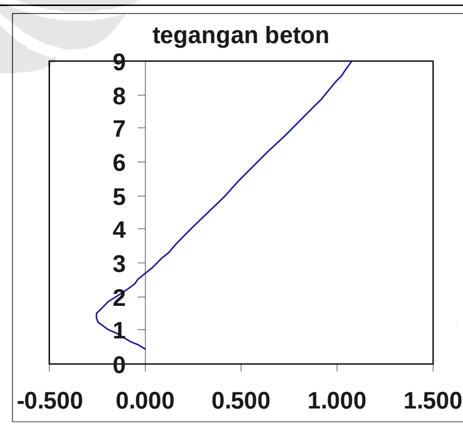


Grafik D.3.5. Tegangan baja prategang vs momen control beban balok PP3R3-3



Grafik D.3.6. Tegangan vs regangan baja pratengang control beban balok PP3R3-3

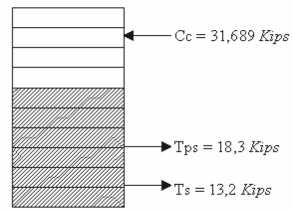
Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang sudah mengalami kegagalan leleh sebelum kehancuran struktur

Retak awal Pada beton P = 3,77 *Kips* Lendutan = 0,055 Inch	 **Gambar D.3.1.** Gaya dalam balok PP3R3-3 pada retak awal
 **Grafik D.3.7.** regangan beton balok PP3R3-3 pada retak awal	 **Grafik D.3.8.** tegangan beton balok PP3R3-3 pada retak awal

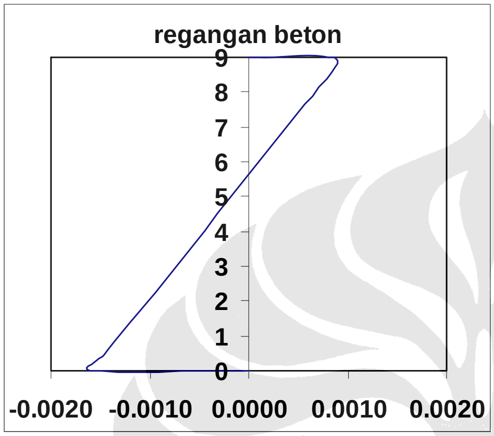
Leleh Pada Baja Prategang

P = 9,11 *Kips*

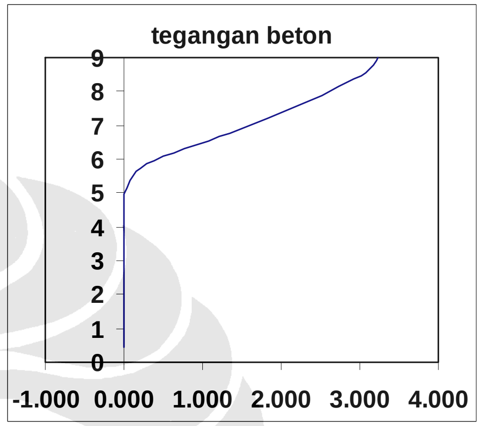
Lendutan = 0,4 Inch



Gambar D.3.2. Gaya dalam balok PP3R3-3 pada leleh baja prategang



Grafik D.3.9. regangan beton balok PP3R3-3 pada leleh baja prategang

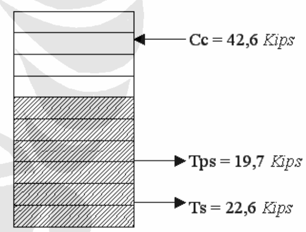


Grafik D.3.10. tegangan beton balok PP3R3-3 pada leleh baja prategang

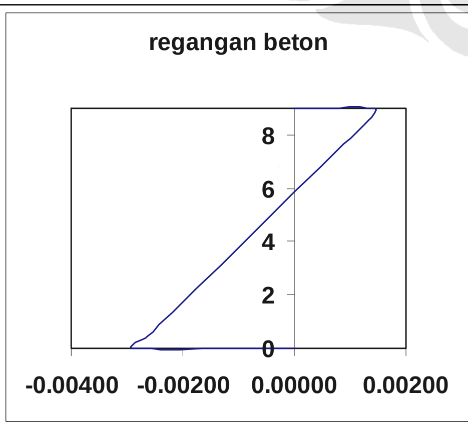
Leleh Pada Baja Tulangan

P = 12,8 *Kips*

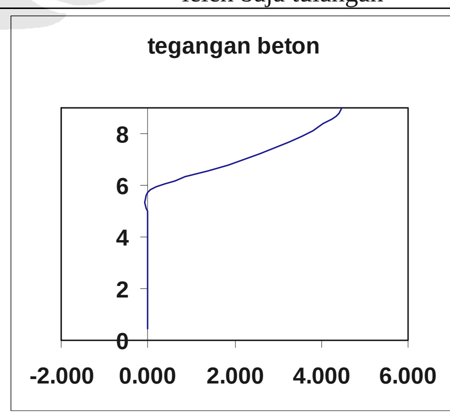
Lendutan = 0,7 Inch



Gambar D.3.3. Gaya dalam balok PP3R3-3 pada leleh baja tulangan



Grafik D.3.11. regangan beton balok PP3R3-3 pada leleh baja tulangan

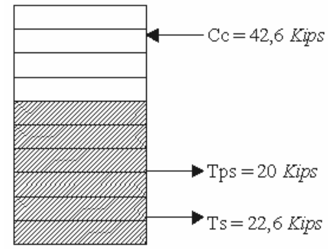


Grafik D.3.12. tegangan beton balok PP3R3-3 pada leleh baja tulangan

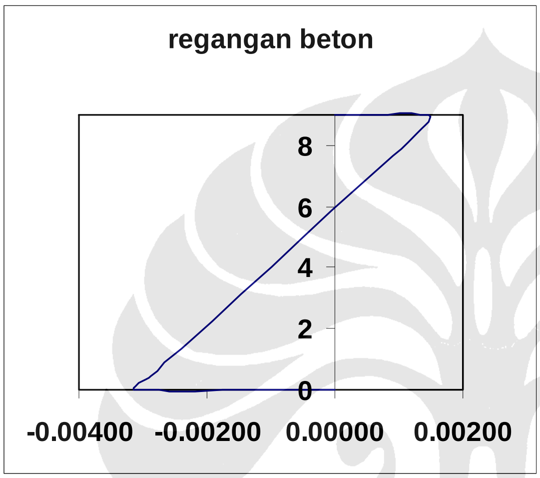
Ultimate

P = 13 *Kips*

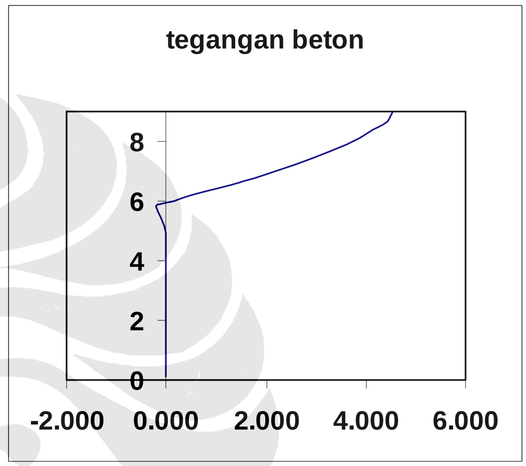
Lendutan = 0,75 Inch



Gambar D.3.4. Gaya dalam balok PP3R3-3 pada ultimate

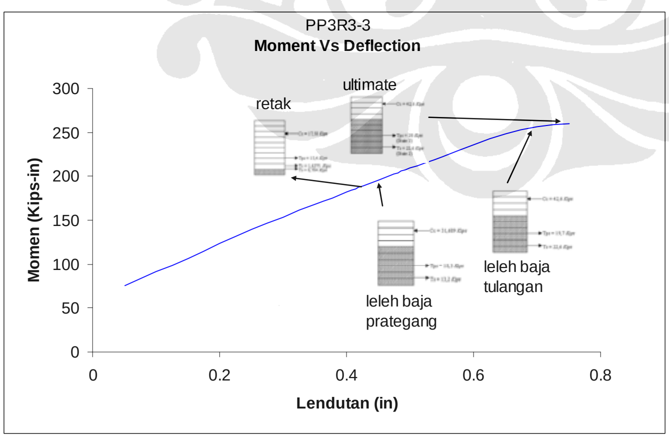


Grafik D.3.13. regangan beton balok PP2R3-3 pada ultimate



Grafik D.3.14. tegangan beton balok PP2R3-3 ultimate

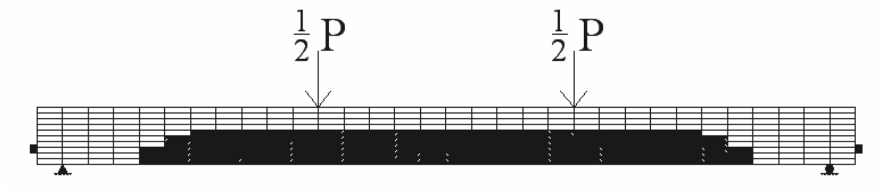
Tahapan Kerusakan Struktur



Grafik D.3.15. Momen vs lendutan tahapan kerusakan struktur balok PP3R3-3

Terlihat pada saat kegagalan baja tulangan dan baja prategang sudah dalam keadaan plastis dan kegagalan yang terjadi akibat crushing pada beton.

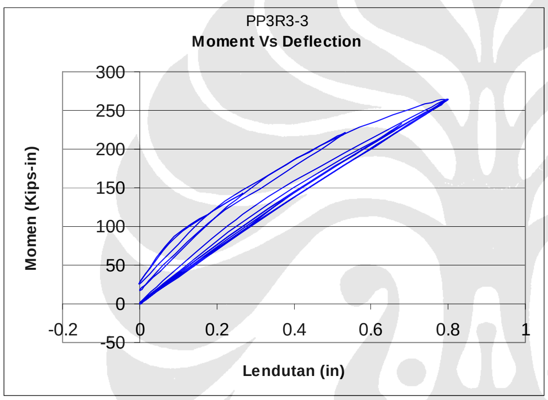
Retak pada beton pada saat ultimate



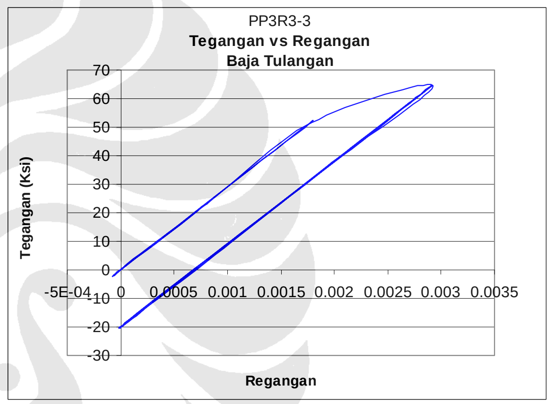
Gambar D.3.5. pola retak saat ultimate pada balok PP3R3-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

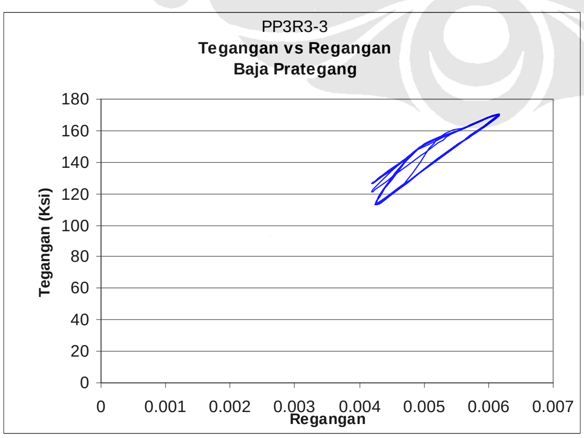


Grafik D.3.16. Momen vs lendutan beban semi siklik balok PP3R3-3



Grafik D.3.17. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP3R3-3

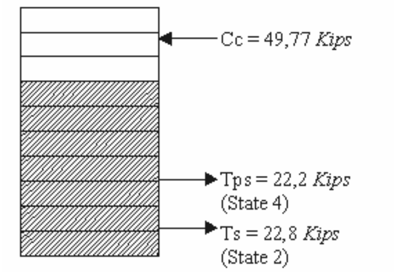
Tegangan vs Regangan Baja Prategang



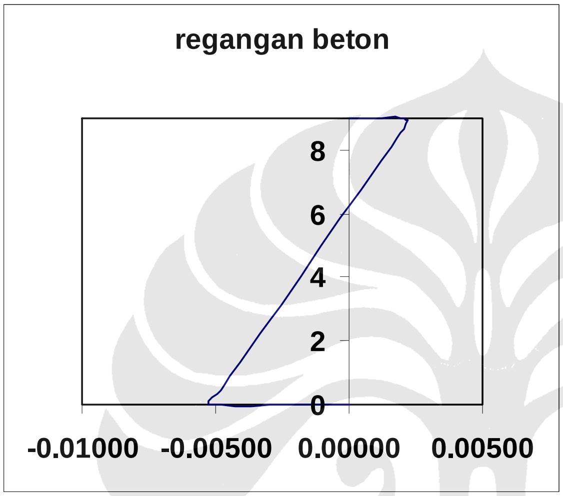
Grafik D.3.18. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP3R3-3

Kondisi Ultimate

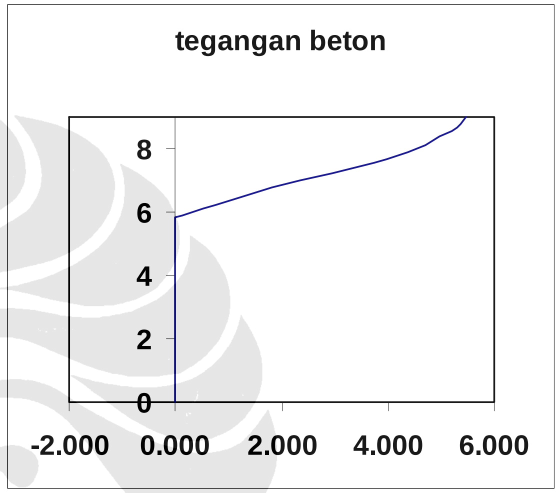
P	=	7,129	*Kips*
Lendutan	=	1,08	*Inch*



Gambar D.3.6. Gaya dalam balok PP3R3-3 pada beban semi siklik



Grafik D.3.19. regangan beton beban semi siklik balok PP3R3-3

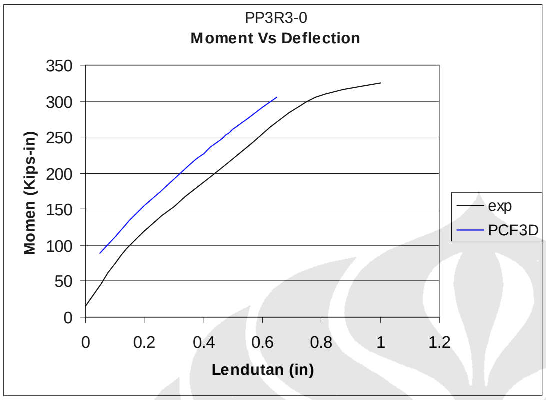


Grafik D.3.20. tegangan beton beban semi siklik balok PP3R3-3

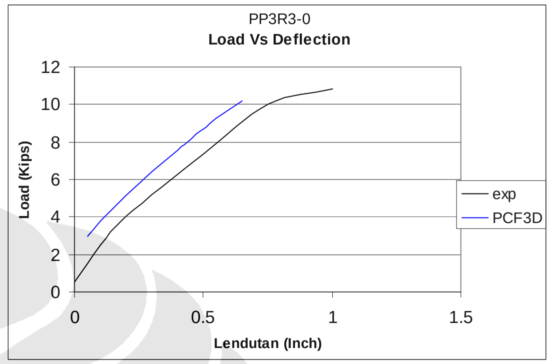
BALOK PP3R3-0

Beban Monotomik

OUPUT



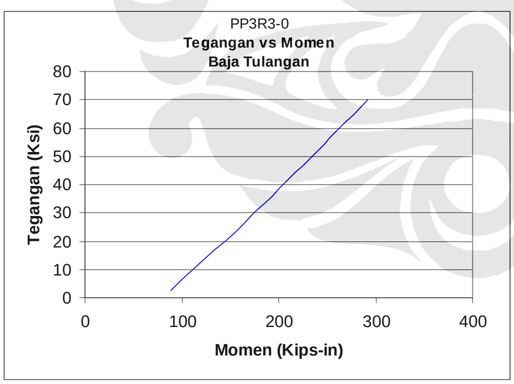
Grafik D.4.1. Momen vs lendutan control beban balok PP3R3-0



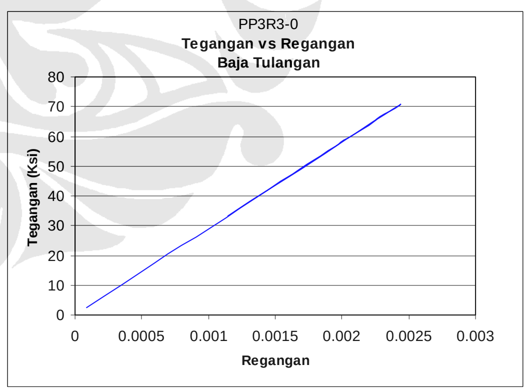
Grafik D.4.2. Beban vs lendutan control beban balok PP3R3-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



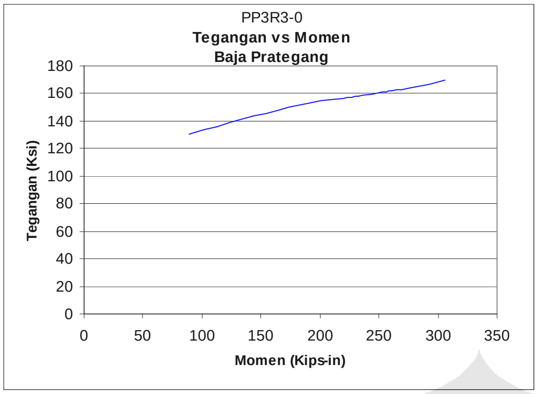
Grafik D.4.3. Tegangan baja tulangan vs momen control beban balok PP3R3-0



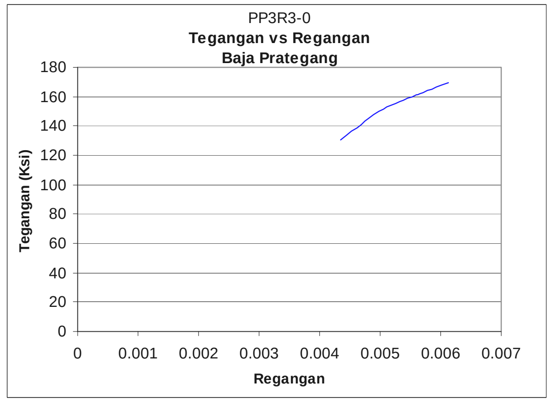
Grafik D.4.4. Tegangan vs regangan baja tulangan control beban balok PP3R3-0

Tegangan baja yang terjadi meningkat sebanding dengan momen yang terjadi, terlihat bahwa baja tulangan belum mengalami kelelehan sebelum kehancuran struktur

Tegangan Baja Prategang



Grafik D.4.5. Tegangan baja prategang vs momen control beban balok PP3R3-0



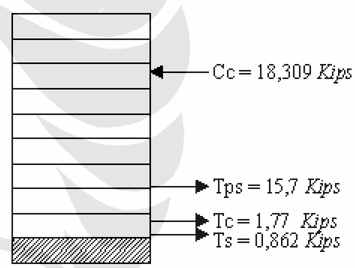
Grafik D.4.6. Tegangan vs regangan baja pratengang control beban balok PP3R3-0

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, Terlihat bahwa baja prategang sudah mengalami leleh sebelum kehancuran struktur

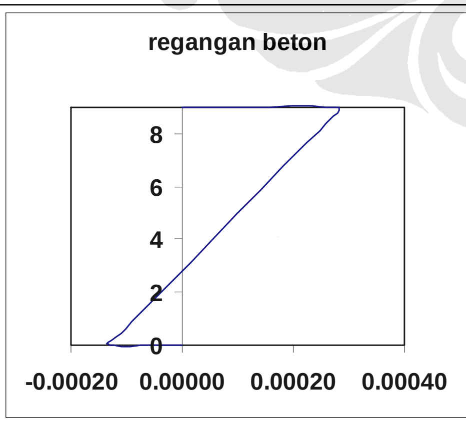
Retak awal Pada beton

P = 2,98 *Kips*

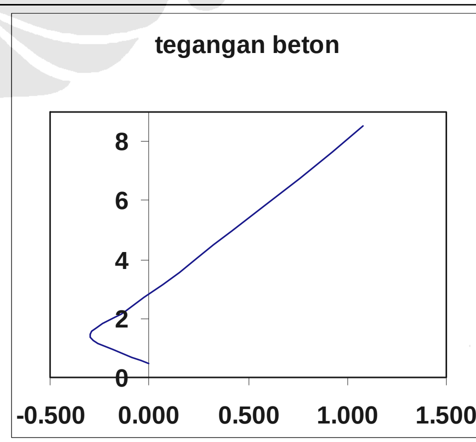
Lendutan = 0,05 Inch



Gambar D.4.1. Gaya dalam balok PP3R3-0 pada retak awal



Grafik D.4.7. regangan beton balok PP3R3-0 pada retak awal

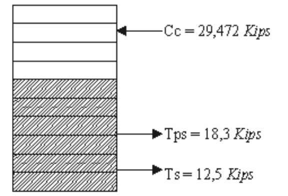


Grafik D.4.8. tegangan beton balok PP3R3-0 pada retak awal

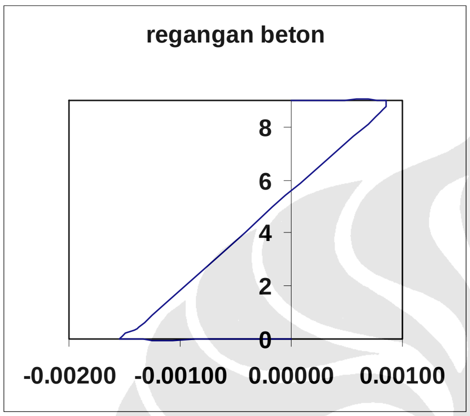
Leleh Pada Baja Prategang

P = 6,4 *Kips*

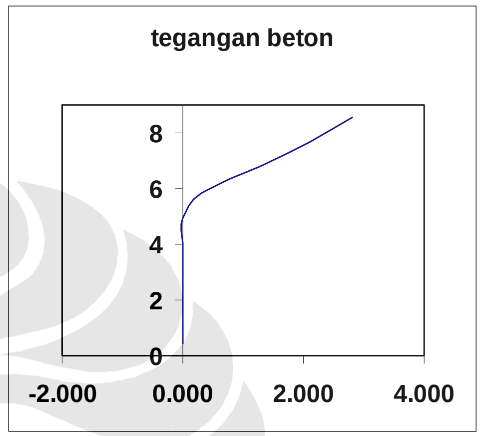
Lendutan = 0,3 Inch



Gambar D.4.2. Gaya dalam balok PP3R3-0 pada leleh baja prategang



Grafik D.4.9. regangan beton balok PP3R3-0 pada leleh baja prategang

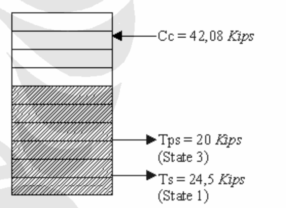


Grafik D.4.10. tegangan beton balok PP3R3-0 pada leleh baja prategang

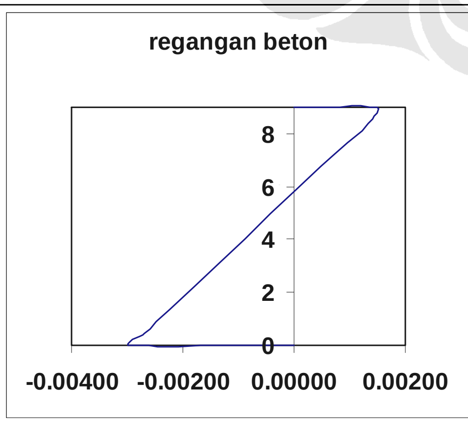
Ultimate

P = 9,74 *Kips*

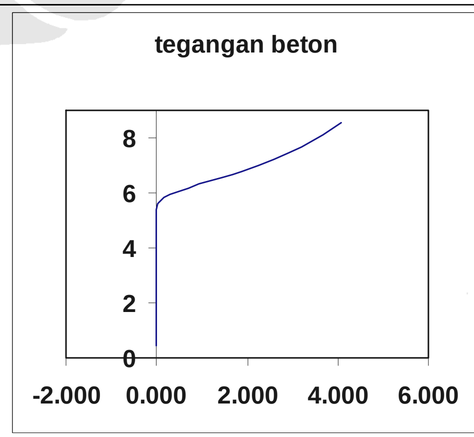
Lendutan = 0,6 Inch



Gambar D.4.3. Gaya dalam balok PP3R3-0 pada ultimate

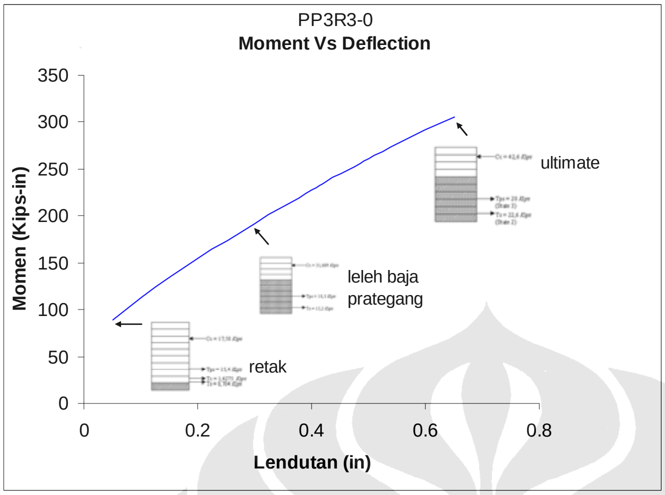


Grafik D.4.11. regangan beton balok PP2R3-0 pada ultimate



Grafik D.4.12. tegangan beton balok PP2R3-0 ultimate

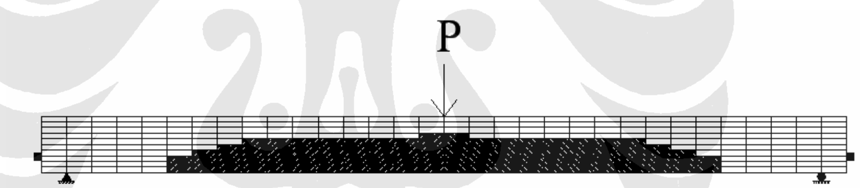
Tahapan Kerusakan Struktur



Grafik D.4.13. Momen vs lendutan tahapan kerusakan struktur balok PP3R3-0

Terlihat pada saat kegagalan baja tulangan belum mengalami leleh sedangkan baja prategang sudah mengalami leleh dan kegagalan yang terjadi akibat crushing pada beton.

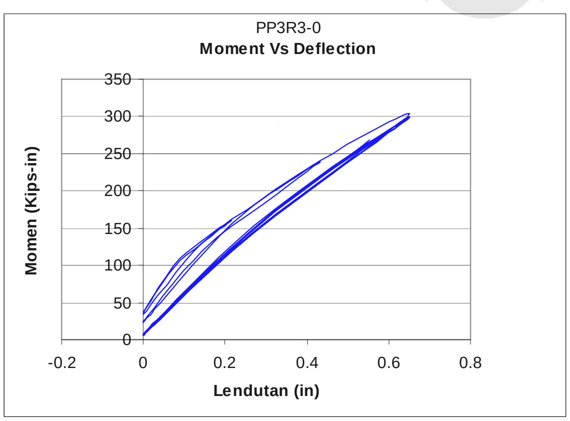
Retak pada beton pada saat ultimate



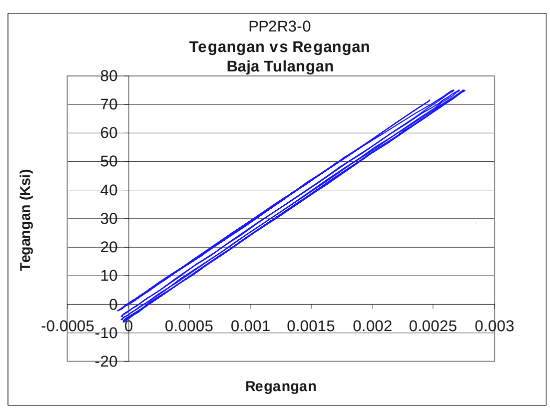
Gambar D.4.4. pola retak saat ultimate pada balok PP3R3-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

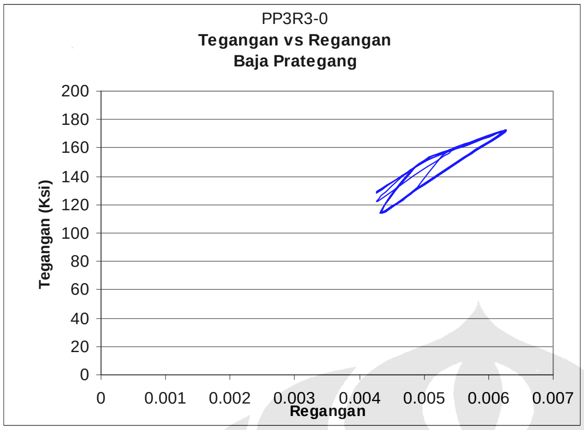


Grafik D.1.14. Momen vs lendutan beban semi siklik balok PP3R3-0



Grafik D.1.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP3R3-0

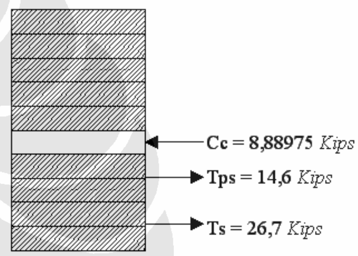
Tegangan vs Regangan Baja Prategang



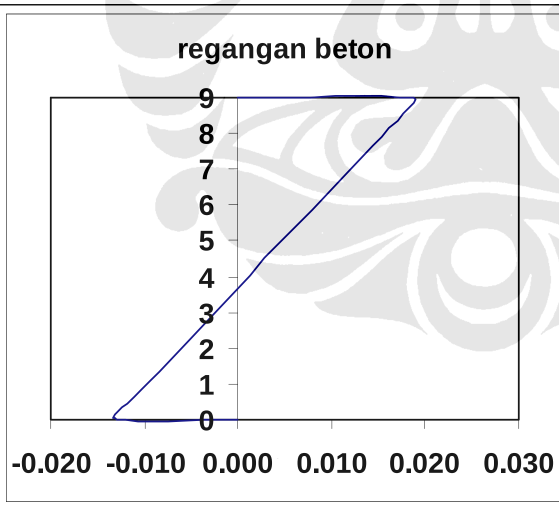
Grafik D.1.16. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP3R3-0

Kondisi Ultimate

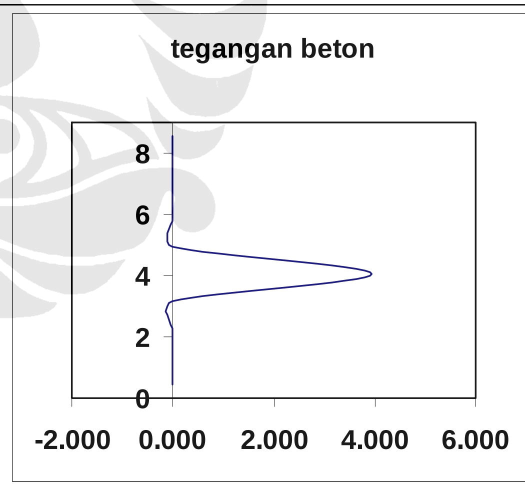
P	=	7,129	*Kips*
Lendutan	=	1,08	*Inch*



Gambar D.1.5. Gaya dalam balok PP3R3-0 pada beban semi siklik



Grafik D.1.17. regangan beton beban semi siklik balok PP3R3-0

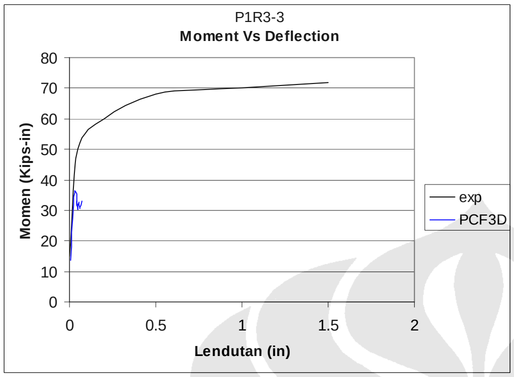


Grafik D.1.18. tegangan beton beban semi siklik balok PP3R3-0

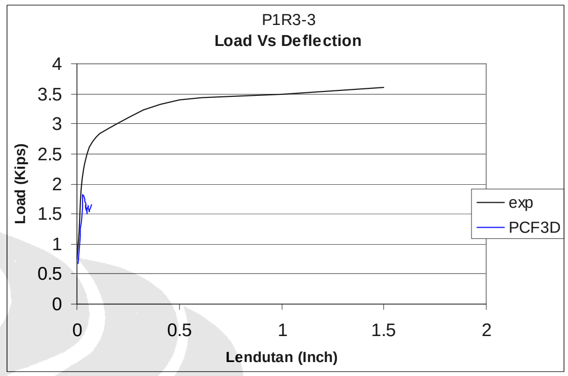
BALOK P1R3-3

Beban Monotomik

OUPUT



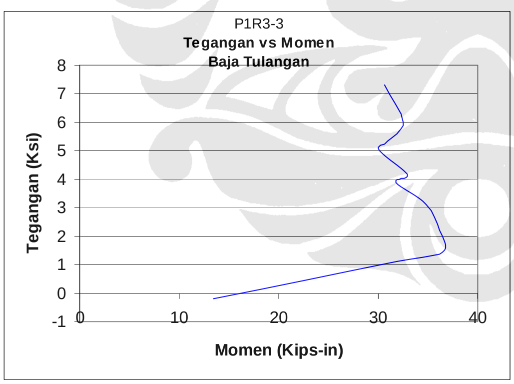
Grafik D.5.1. Momen vs lendutan control beban balok P1R3-3



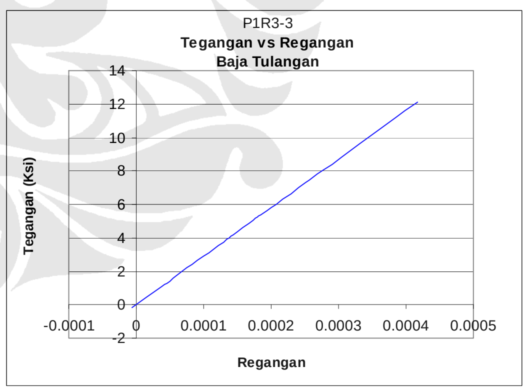
Grafik D.5.2. Beban vs lendutan control beban balok P1R3-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



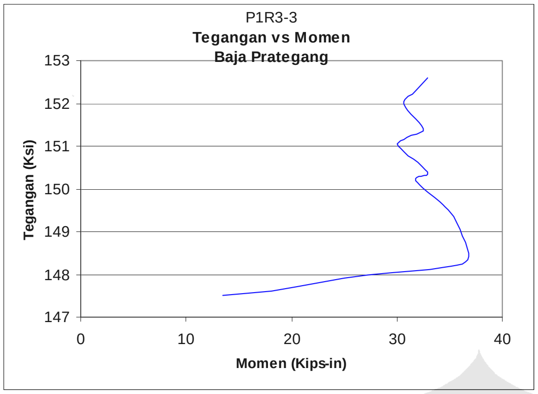
Grafik D.5.3. Tegangan baja tulangan vs momen control beban balok P1R3-3



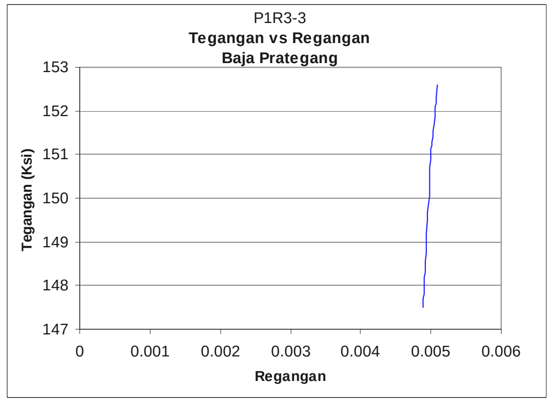
Grafik D.5.4. Tegangan vs regangan baja tulangan control beban balok P1R3-3

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.5.5. Tegangan baja prategang vs momen control beban balok P1R3-3



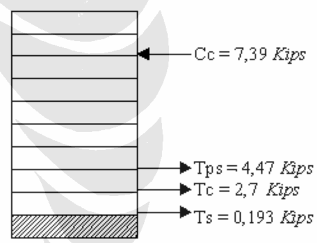
Grafik D.5.6. Tegangan vs regangan baja pratengang control beban balok P1R3-3

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

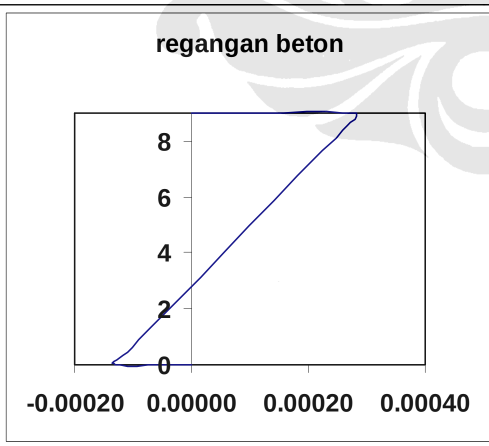
Retak awal Pada beton

P = 1,81 *Kips*

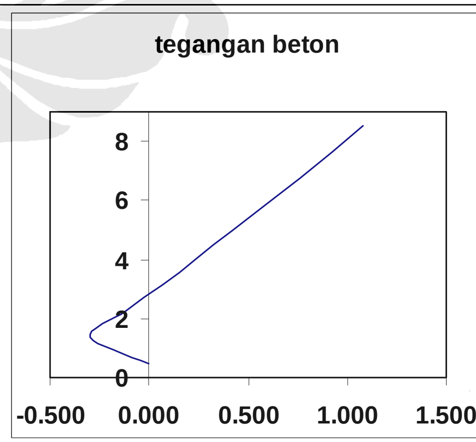
Lendutan = 0,035 Inch



Gambar D.5.1. Gaya dalam balok P1R3-3 pada retak awal



Grafik D.5.7. regangan beton balok P1R3-3 pada retak awal

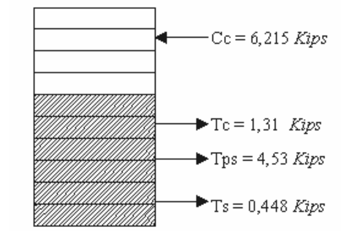


Grafik D.5.8. tegangan beton balok P1R3-3 pada retak awal

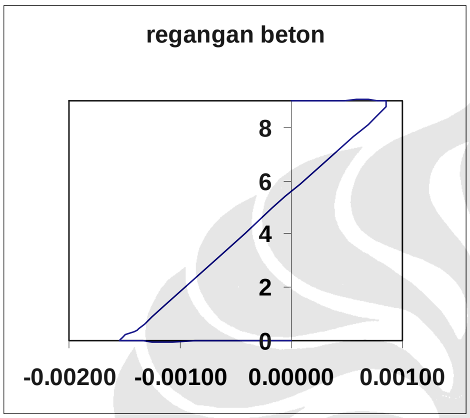
Leleh Pada Baja Prategang

P = 1,52 *Kips*

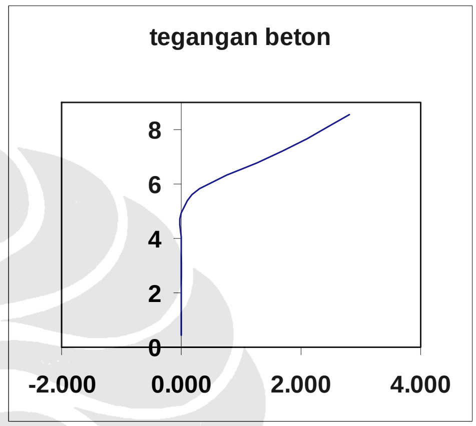
Lendutan = 0,05 Inch



Gambar D.5.2. Gaya dalam balok P1R3-3 pada leleh baja prategang



Grafik D.5.9. regangan beton balok P1R3-3 pada leleh baja prategang

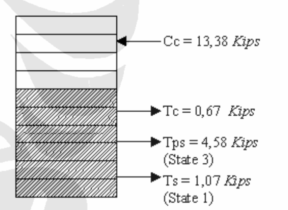


Grafik D.5.10. tegangan beton balok P1R3-3 pada leleh baja prategang

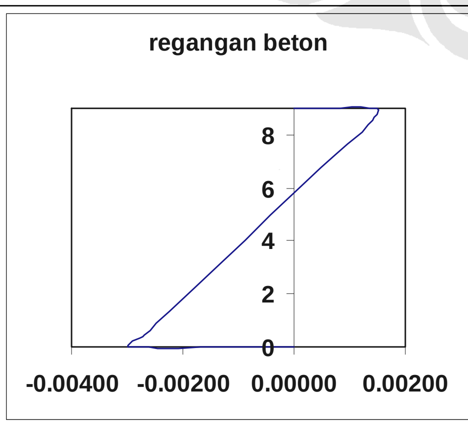
Ultimate

P = 1,64 *Kips*

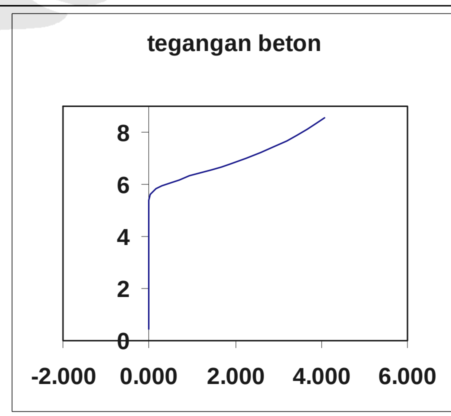
Lendutan = 0,7 Inch



Gambar D.5.3. Gaya dalam balok P1R3-3 pada ultimate

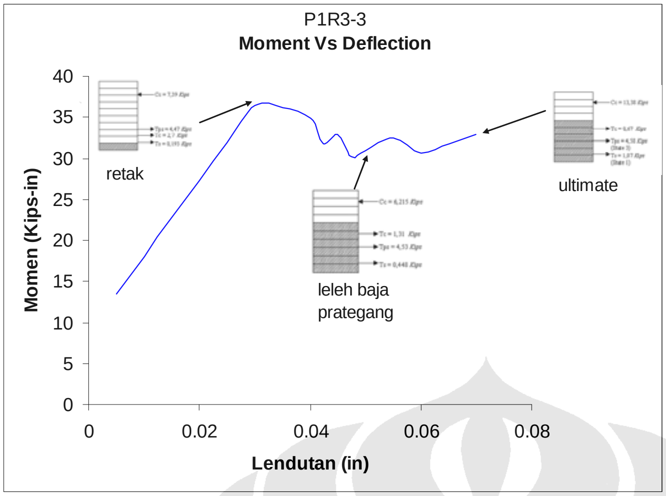


Grafik D.5.11. regangan beton balok P1R3-3 pada ultimate



Grafik D.5.12. tegangan beton balok P1R3-3 ultimate

Tahapan Kerusakan Struktur



Grafik D.5.13. Momen vs lendutan tahapan kerusakan struktur balok P1R3-3

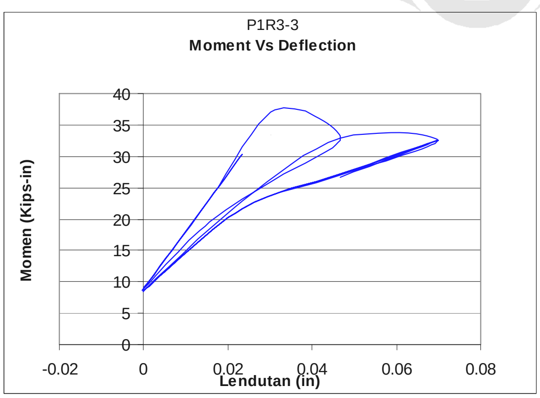
terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil

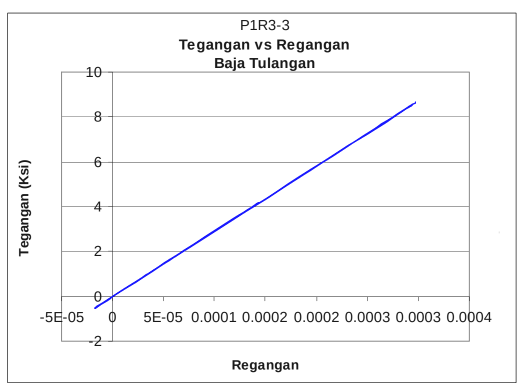
Retak pada beton pada saat ultimate

Gambar D.5.4. pola retak saat ultimate pada balok P1R3-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat geser

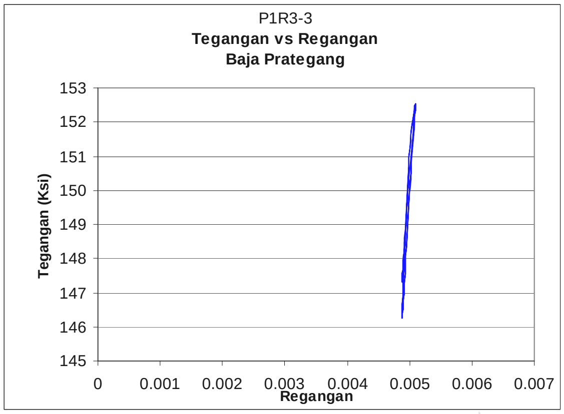
Beban Semi Siklik





Grafik D.5.14. Momen vs lendutan beban semi siklik balok P1R3-3

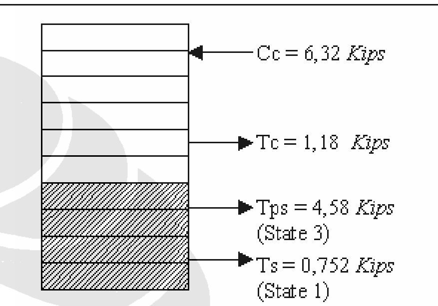
Grafik D.5.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P1R3-3



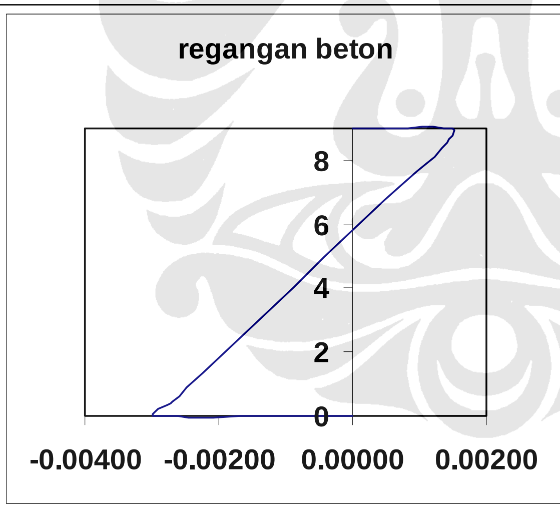
Grafik D.5.16. Tegangan vs regangan baja prategang akibat beban semi siklik balok P1R3-3

Kondisi Ultimate

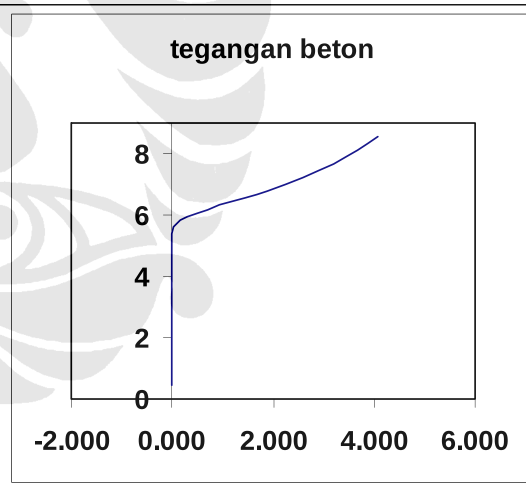
P	=	1,64 *Kips*
Lendutan	=	0,0725 *Inch*



Gambar D.5.5. Gaya dalam balok P1R3-3 pada beban semi siklik



Grafik D.5.17. regangan beton beban semi siklik balok P1R3-3

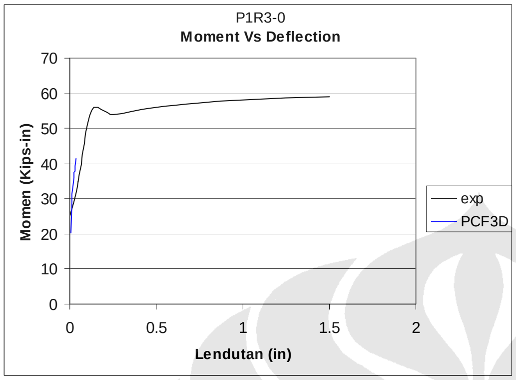


Grafik D.5.18. tegangan beton beban semi siklik balok P1R3-3

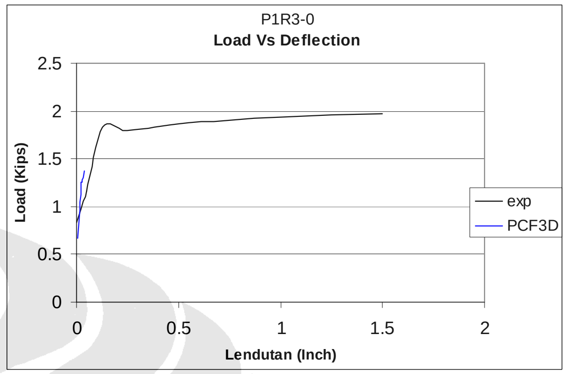
BALOK P1R3-0

Beban Monotomik

OUPUT



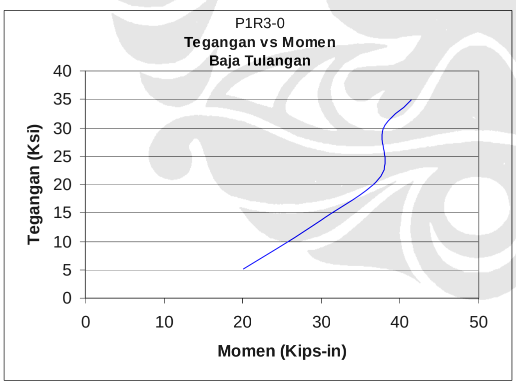
Grafik D.6.1. Momen vs lendutan control beban balok P1R3-0



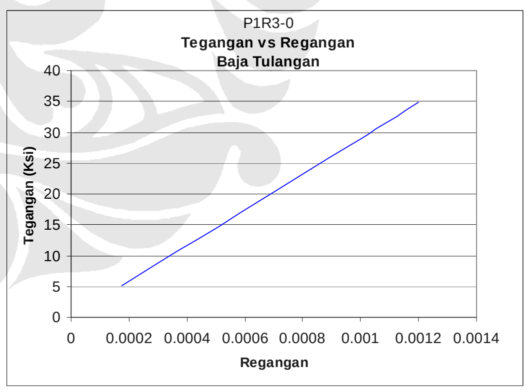
Grafik D.6.2. Beban vs lendutan control beban balok P1R3-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



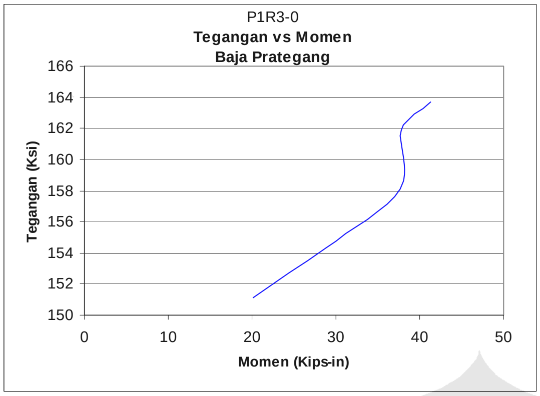
Grafik D.6.3. Tegangan baja tulangan vs momen control beban balok P1R3-0



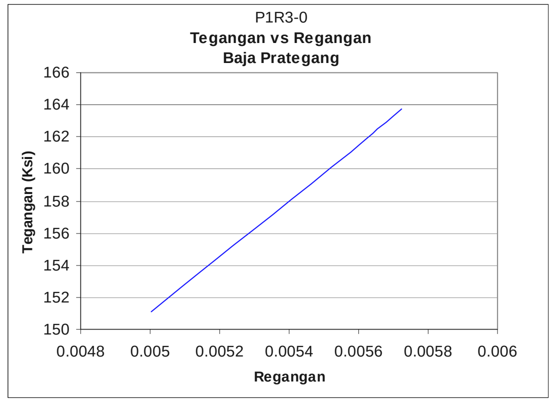
Grafik D.6.4. Tegangan vs regangan baja tulangan control beban balok P1R3-0

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak ,terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.6.5. Tegangan baja prategang vs momen control beban balok P1R3-0



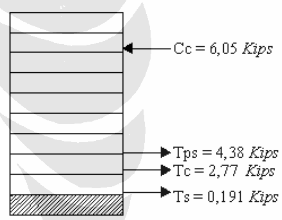
Grafik D.6.6. Tegangan vs regangan baja prategang control beban balok P1R3-0

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

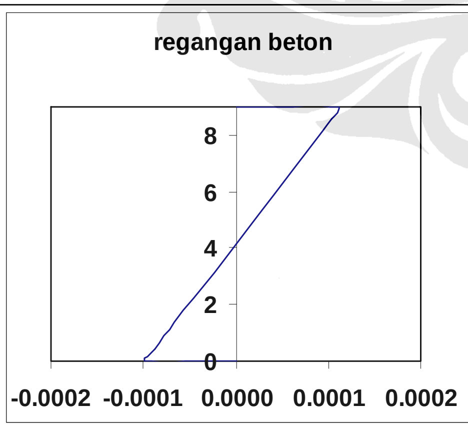
Retak awal Pada beton

P = 1,22 *Kips*

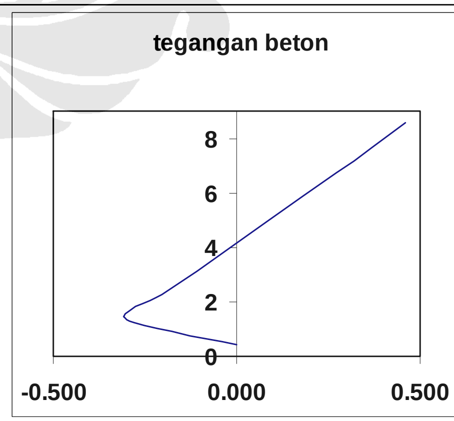
Lendutan = 0,0263 Inch



Gambar D.6.1. Gaya dalam balok P1R3-0 pada retak awal



Grafik D.6.7. regangan beton balok P1R3-0 pada retak awal

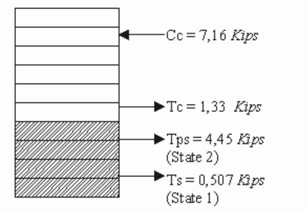


Grafik D.6.8. tegangan beton balok P1R3-0 pada retak awal

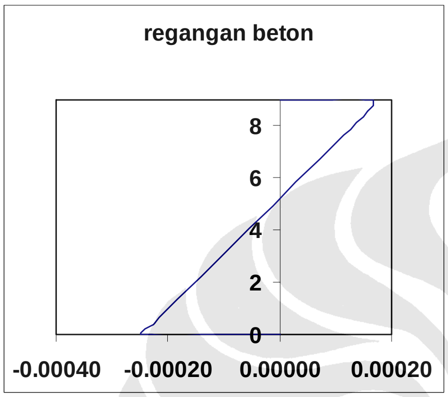
Ultimate

P = 1,07 *Kips*

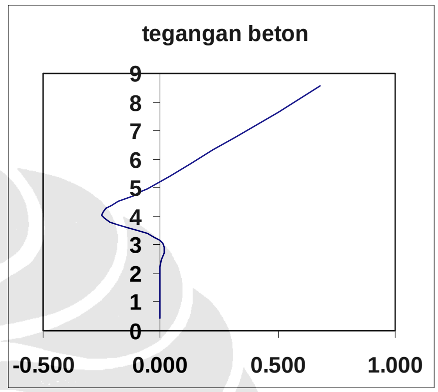
Lendutan = 0,03 Inch



Gambar D.6.2. Gaya dalam balok P1R3-0 pada ultimate

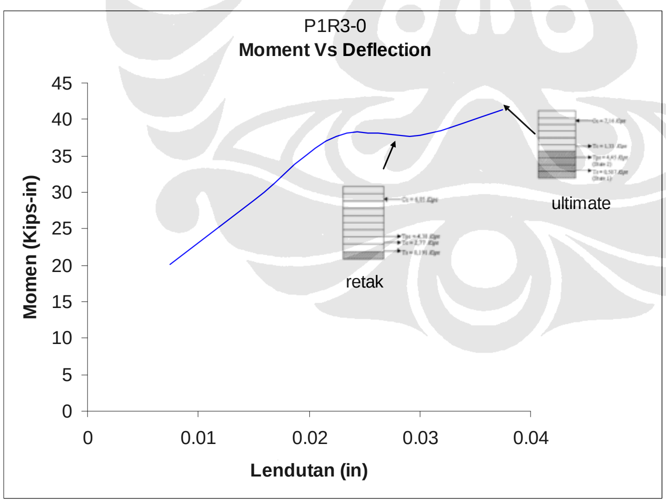


Grafik D.6.9. regangan beton balok P1R3-0 pada ultimate



Grafik D.6.10. tegangan beton balok P1R3-0 ultimate

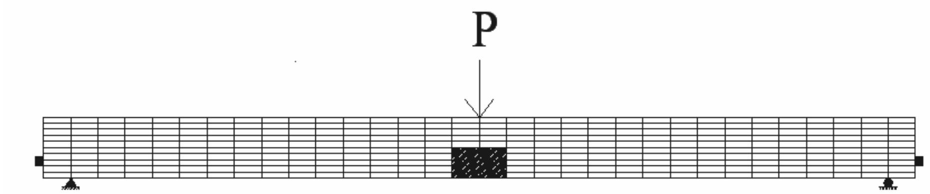
Tahapan Kerusakan Struktur



Grafik D.6.11. Momen vs lendutan tahapan kerusakan struktur alok P1R3-0

Terlihat pada saat kegagalan baja tulangan dan baja prategang belum mengalami kelelehan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

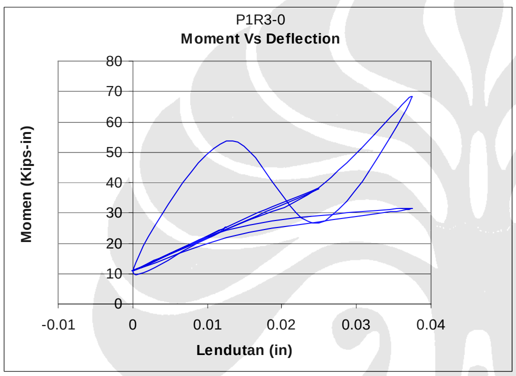
Retak pada beton pada saat ultimate



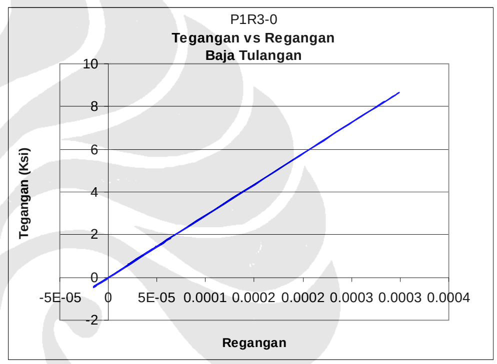
Gambar D.6.3. pola retak saat ultimate pada balok P1R3-0

terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat geser

Beban Semi Siklik

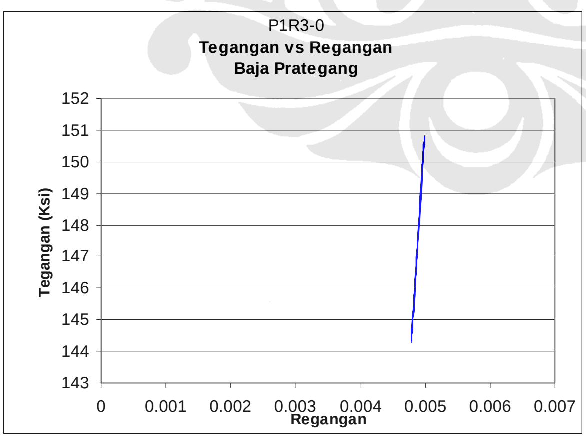


Grafik D.6.12. Momen vs lendutan beban semi siklik balok P1R3-0



Grafik D.6.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P1R3-0

Tegangan vs Regangan Baja Prategang

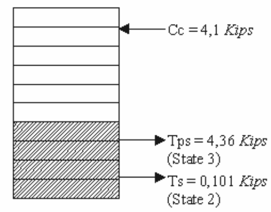


Grafik D.6.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P1R3-0

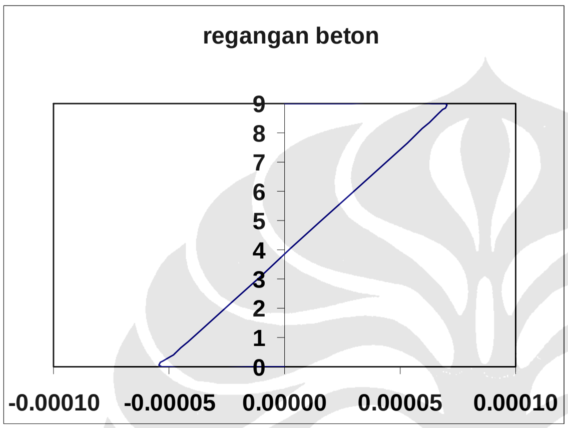
Kondisi Ultimate

P = 1,64 *Kips*

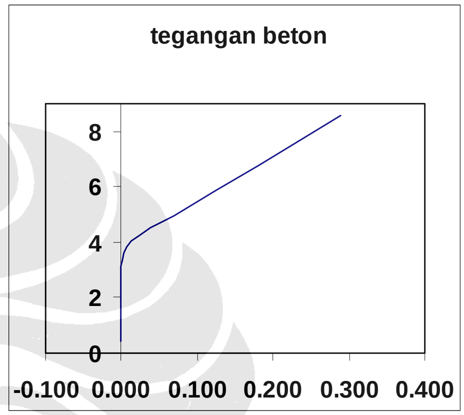
Lendutan = 0,0725 *Inch*



Gambar D.6.4. Gaya dalam balok P1R3-3 pada beban semi siklik



Grafik D.6.15. regangan beton beban semi siklik balok P1R3-0

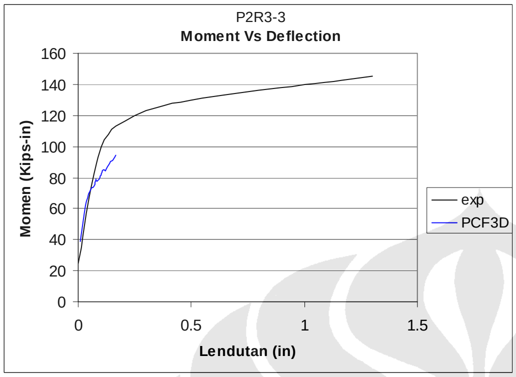


Grafik D.6.17. tegangan beton beban semi siklik balok P1R3-0

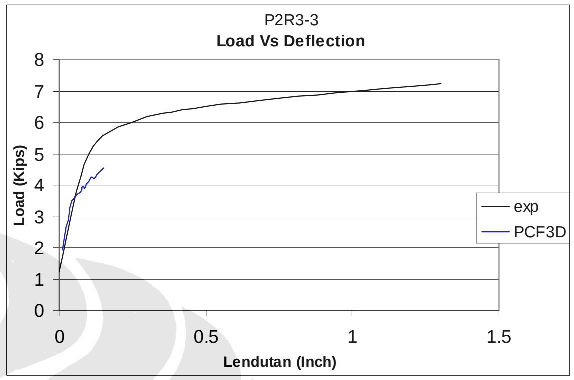
BALOK P2R3-3

Beban Monotomik

OUPUT



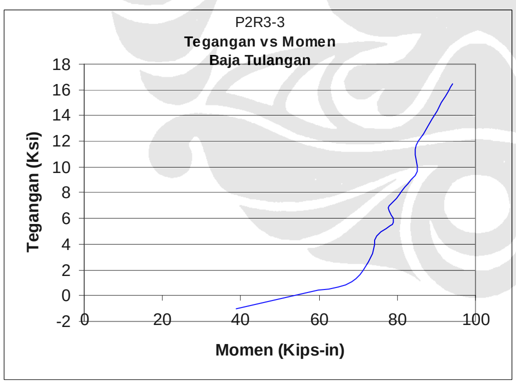
Grafik D.7.1. Momen vs lendutan control beban balok P2R3-3



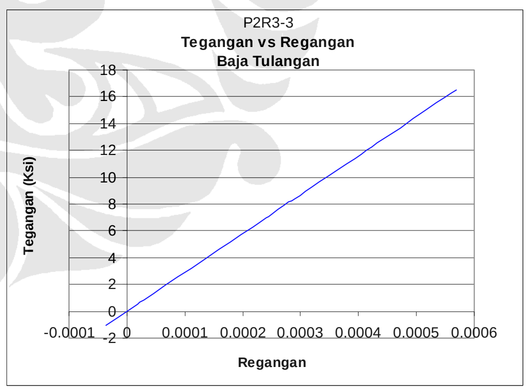
Grafik D.7.2. Beban vs lendutan control beban balok P2R3-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



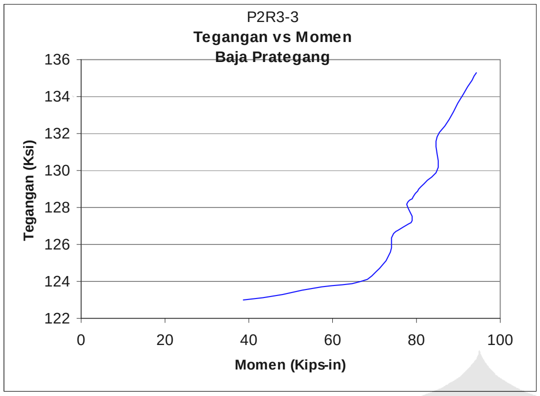
Grafik D.7.3. Tegangan baja tulangan vs momen control beban balok P2R3-3



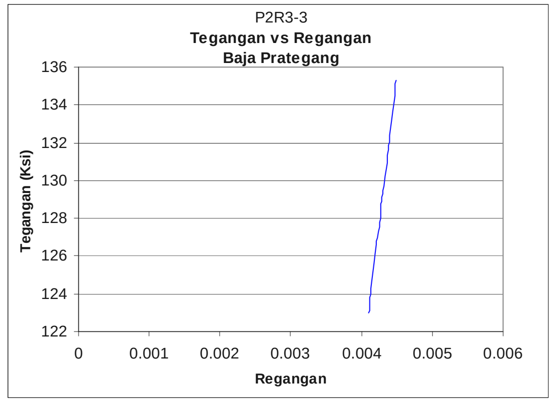
Grafik D.7.4. Tegangan vs regangan baja tulangan control beban balok P2R3-3

Tegangan baja yang terjadi meningkat sebanding dengan momen yang terjadi,terlihat bahwa baja tulangan masih dalam kondisi elastis pada saat kegagalan struktur.

Tegangan Baja Prategang



Grafik D.7.5. Tegangan baja prategang vs momen control beban balok P2R3-3



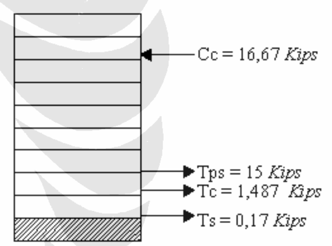
Grafik D.7.6. Tegangan vs regangan baja prategang control beban balok P2R3-3

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang masih dalam kondisi elastis pada saat kehancuran struktur.

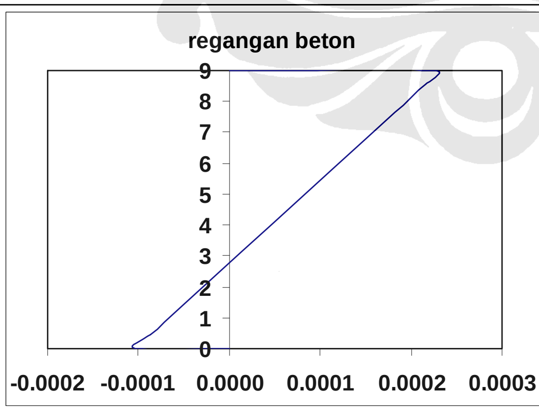
Retak awal Pada beton

P = 3,56 *Kips*

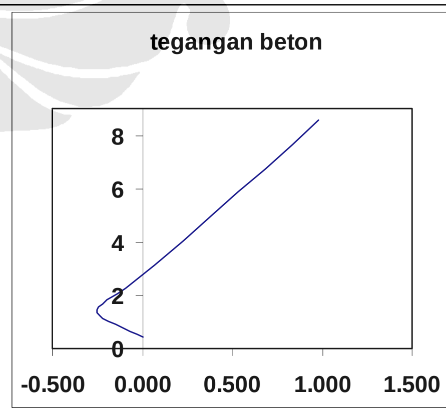
Lendutan = 0,05 Inch



Gambar D.7.1. Gaya dalam balok P2R3-3 pada retak awal



Grafik D.7.7. regangan beton balok P2R3-3 pada retak awal

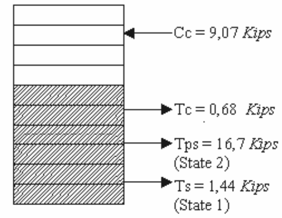


Grafik D.7.8. tegangan beton balok P2R3-3 pada retak awal

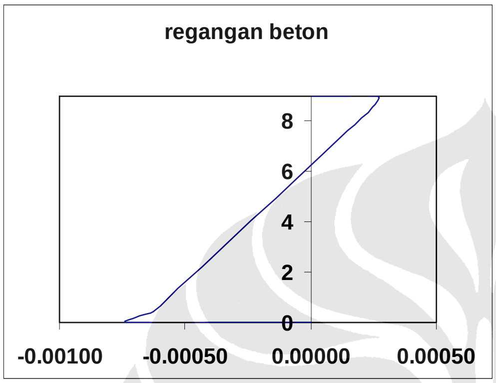
Ultimate

P = 4,9 *Kips*

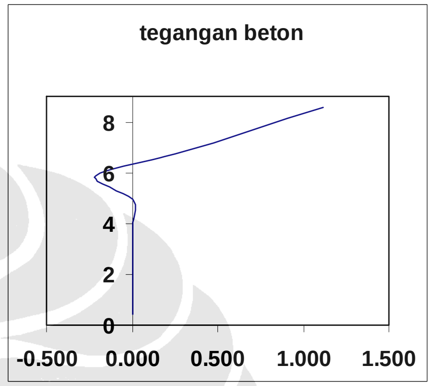
Lendutan = 0,21 Inch



Gambar D.7.2. Gaya dalam balok P2R3-3 pada ultimate

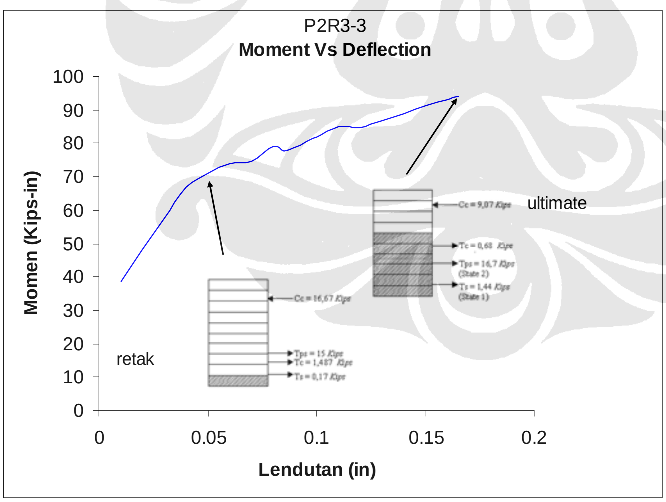


Grafik D.7.9. regangan beton balok P2R3-3 pada ultimate



Grafik D.7.10. tegangan beton balok P2R3-3 ultimate

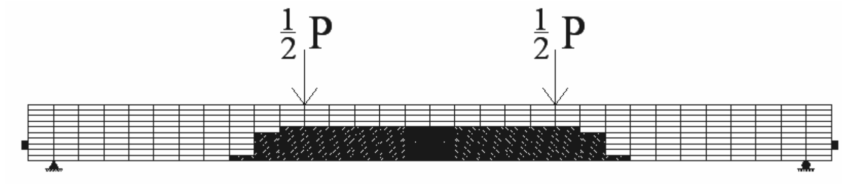
Tahapan Kerusakan Struktur



Grafik D.7.11. Momen vs lendutan tahapan kerusakan struktur balok P2R3-3

Terlihat pada saat kegagalan baja tulangan dan baja prategang belum mengalami kelelehan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

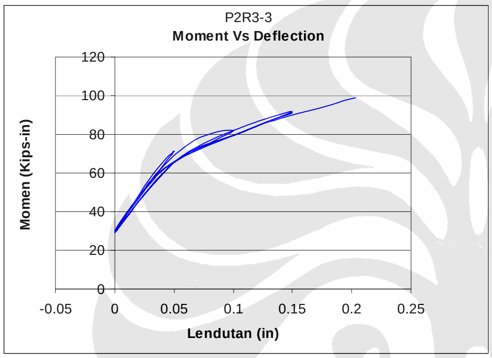
Retak pada beton pada saat ultimate



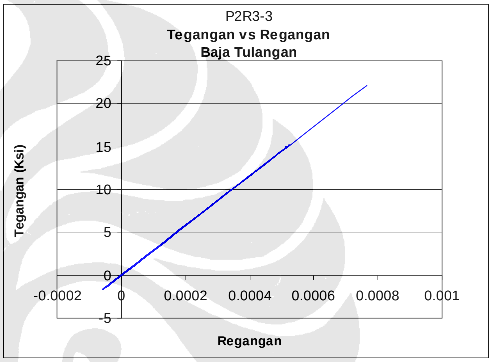
Gambar D.7.3. pola retak saat ultimate pada balok P2R3-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

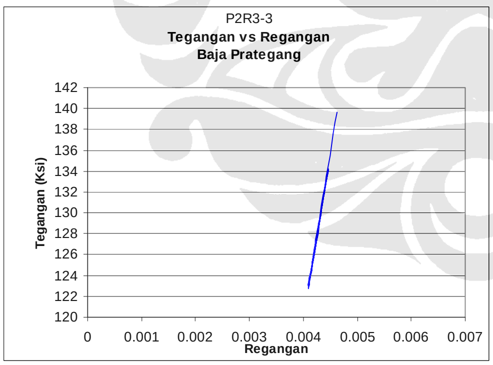
Beban Semi Siklik



Grafik D.7.12. Momen vs lendutan beban semi siklik balok P2R3-3



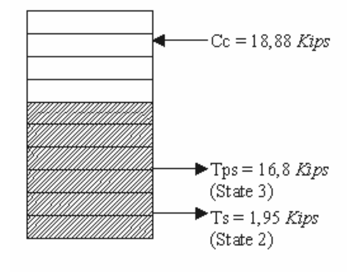
Grafik D.7.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P2R3-3



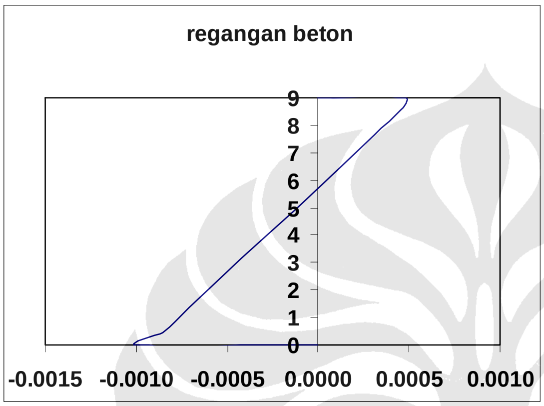
Grafik D.7.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P2R3-3

Kondisi Ultimate

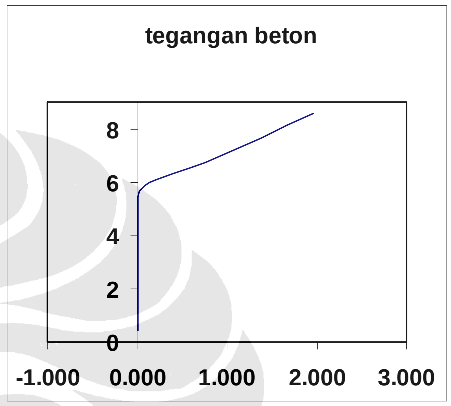
P	=	4,9	*Kips*
Lendutan	=	0,21	*Inch*



Gambar D.7.4. Gaya dalam balok P2R3-3 pada beban semi siklik



Grafik D.7.15. regangan beton beban semi siklik balok P2R3-3

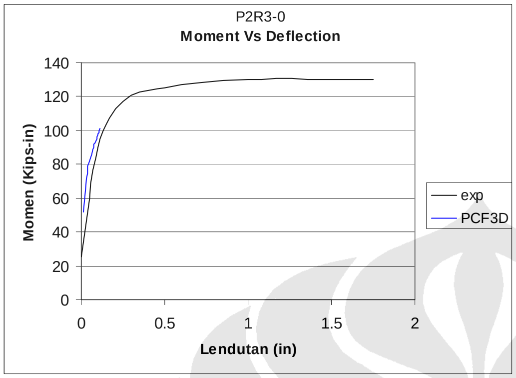


Grafik D.7.16. tegangan beton beban semi siklik balok P2R3-3

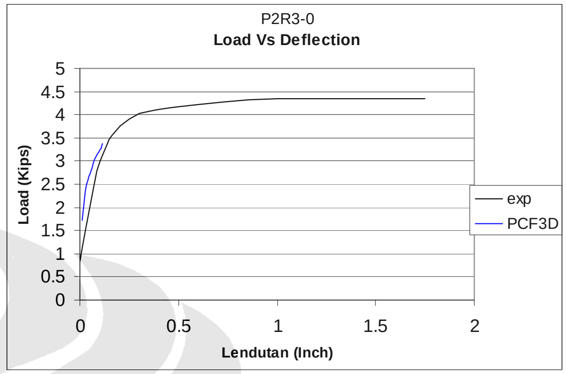
BALOK P2R3-0

Beban Monotomik

OUPUT



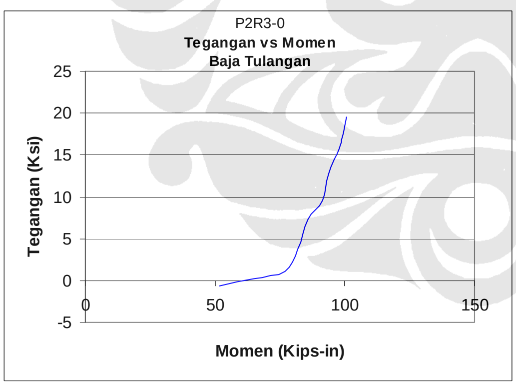
Grafik D.8.1. Momen vs lendutan control beban balok P2R3-0



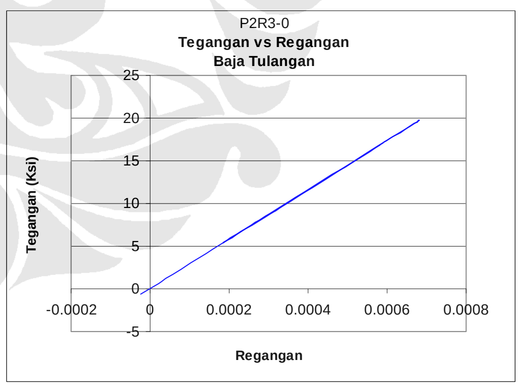
Grafik D.8.2. Beban vs lendutan control beban balok P2R3-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



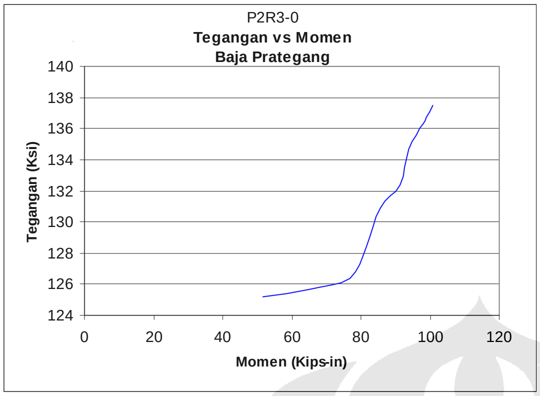
Grafik D.8.3. Tegangan baja tulangan vs momen control beban balok P2R3-0



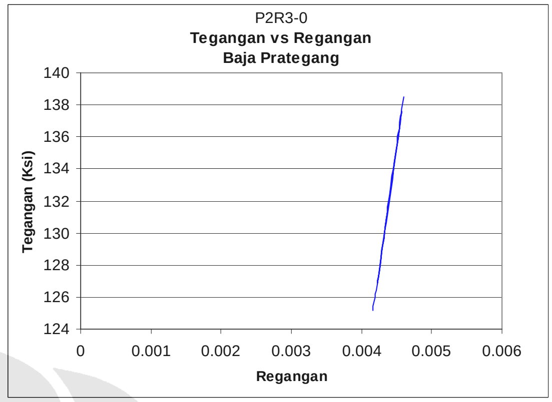
Grafik D.8.4. Tegangan vs regangan baja tulangan control beban balok P2R3-0

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.8.5. Tegangan baja prategang vs momen control beban balok P2R3-0



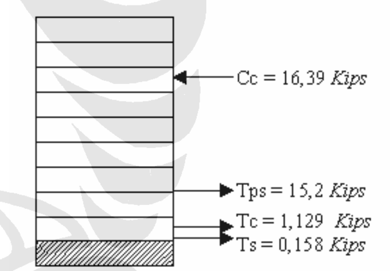
Grafik D.8.6. Tegangan vs regangan baja prategang control beban balok P2R3-0

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang masih dalam kondisi elastis pada saat kehancuran struktur.

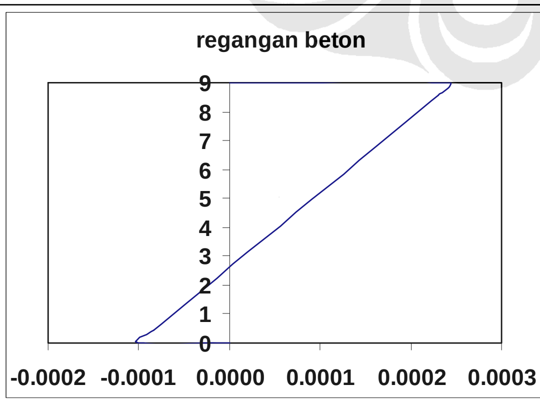
Retak awal Pada beton

P = 1,81 *Kips*

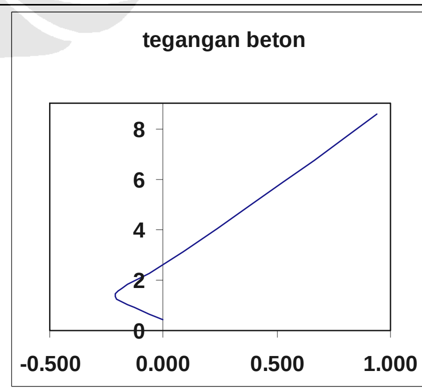
Lendutan = 0,035 Inch



Gambar D.8.1. Gaya dalam balok P2R3-0 pada retak awal



Grafik D.8.7. regangan beton balok P2R3-0 pada retak awal

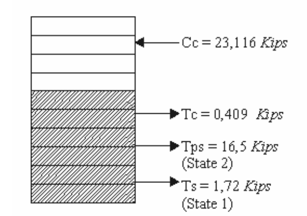


Grafik D.8.8. tegangan beton balok P2R3-0 pada retak awal

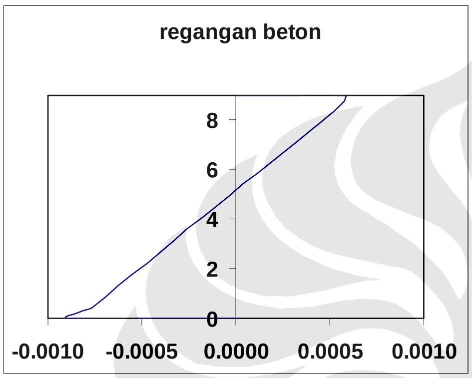
Ultimate

P = 1,64 *Kips*

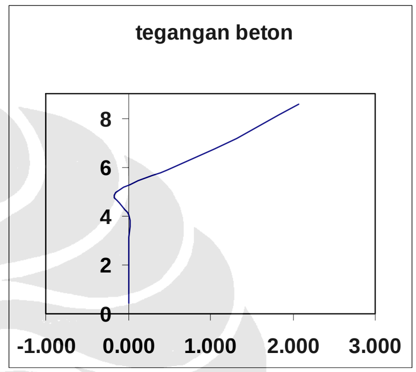
Lendutan = 0,7 Inch



Gambar D.8.2. Gaya dalam balok P2R3-0 pada ultimate

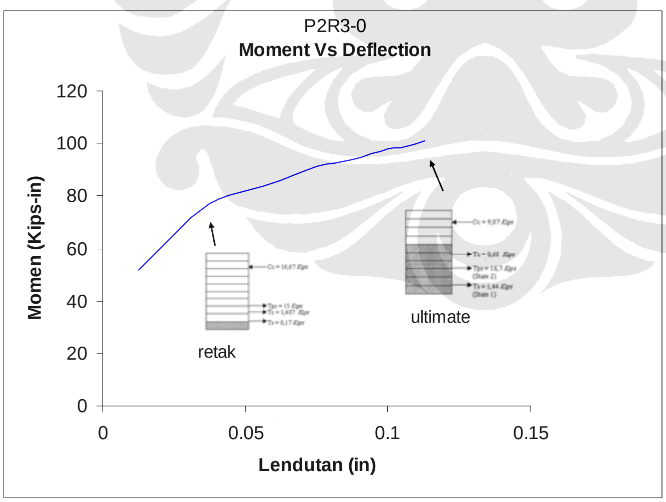


Grafik D.8.9. regangan beton balok P2R3-0 pada ultimate



Grafik D.8.10. tegangan beton balok P2R3-0 ultimate

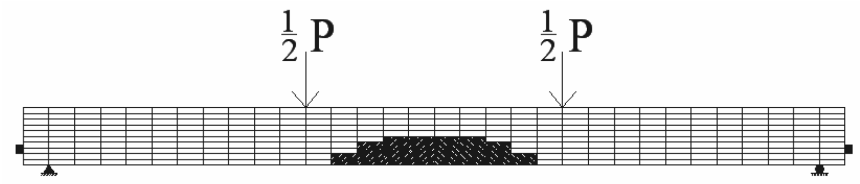
Tahapan Kerusakan Struktur



Grafik D.8.11. Momen vs lendutan tahapan kerusakan struktur balok P2R3-0

Terlihat pada saat kegagalan baja tulangan dan baja prategangn belum mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

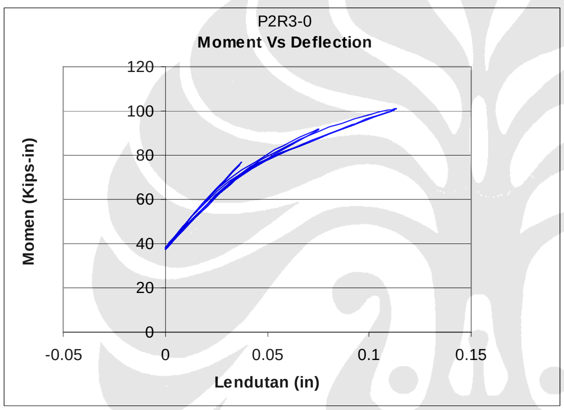
Retak pada beton pada saat ultimate



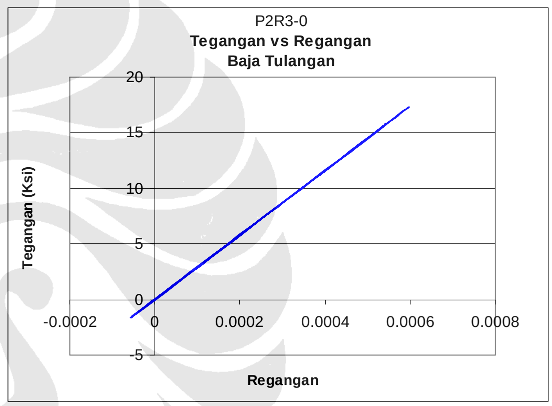
Gambar D.8.3. pola retak saat ultimate pada balok P2R3-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat geser

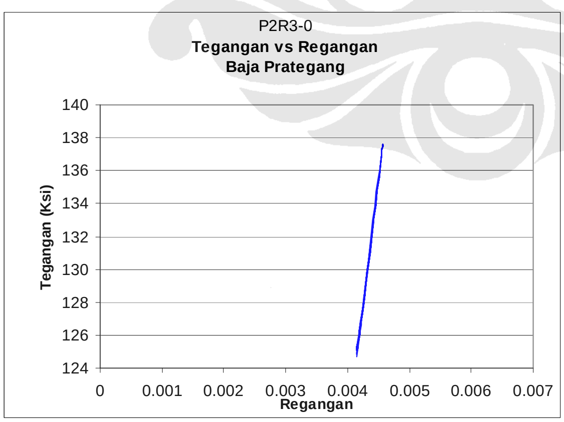
Beban Semi Siklik



Grafik D.8.12. Momen vs lendutan beban semi siklik balok P2R3-0



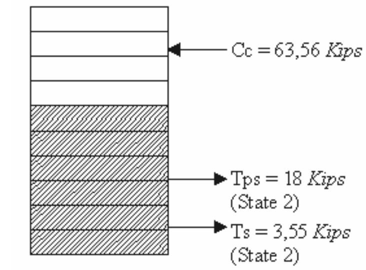
Grafik D.8.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P2R3-0



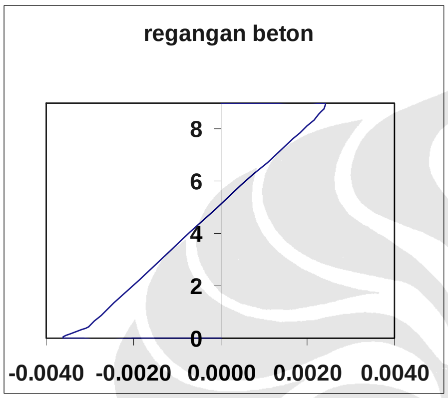
Grafik D.8.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P2R3-0

Kondisi Ultimate

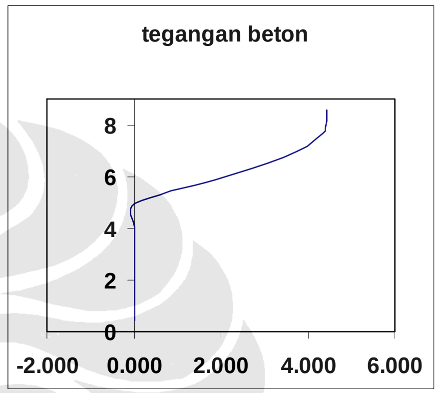
P	=	3,73 *Kips*
Lendutan	=	0,153 *Inch*



Gambar D.8.4. Gaya dalam balok P1R3-0 pada beban semi siklik



Grafik D.8.15. regangan beton beban semi siklik balok P2R3-0

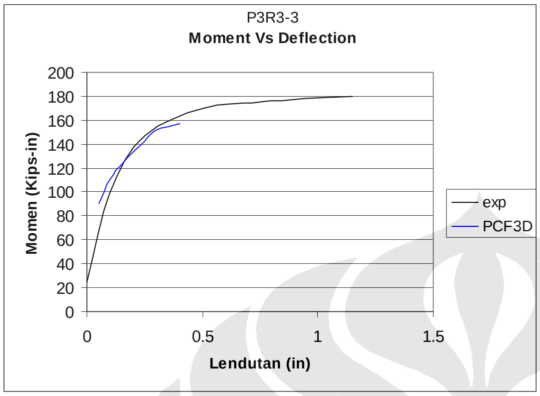


Grafik D.8.17. tegangan beton beban semi siklik balok P2R3-0

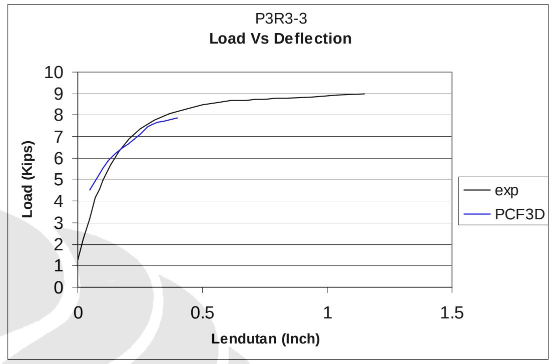
BALOK P3R3-3

Beban Monotomik

OUPUT



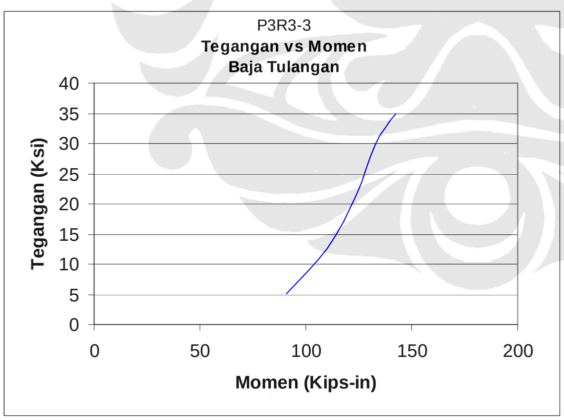
Grafik D.9.1. Momen vs lendutan control beban balok P3R3-3



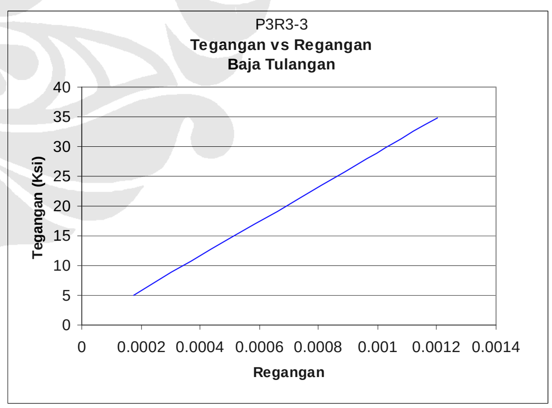
Grafik D.9.2. Beban vs lendutan control beban balok P3R3-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



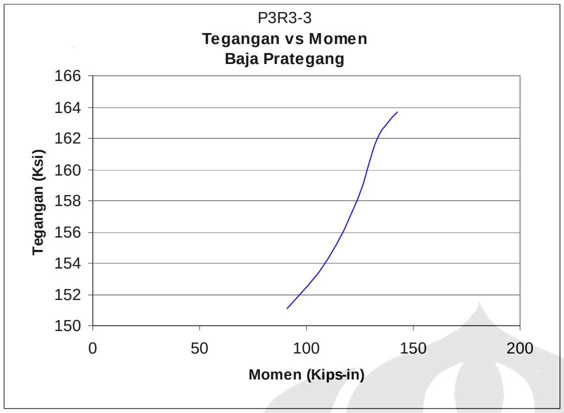
Grafik D.9.3. Tegangan baja tulangan vs momen control beban balok P3R3-3



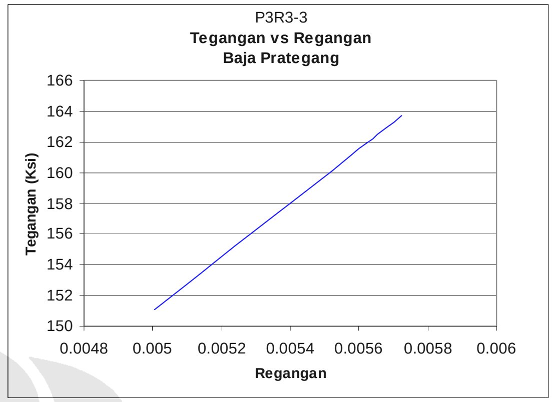
Grafik D.9.4. Tegangan vs regangan baja tulangan control beban balok P3R3-3

Tegangan baja menigkat seiring menigkatnya momen yang terjadi , terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan.

Tegangan Baja Prategang



Grafik D.9.5. Tegangan baja prategang vs momen control beban balok P3R3-3



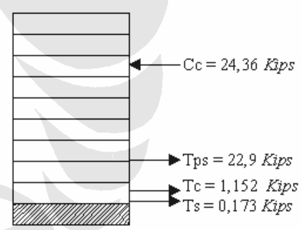
Grafik D.9.6. Tegangan vs regangan baja prategang control beban balok P3R3-3

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan.

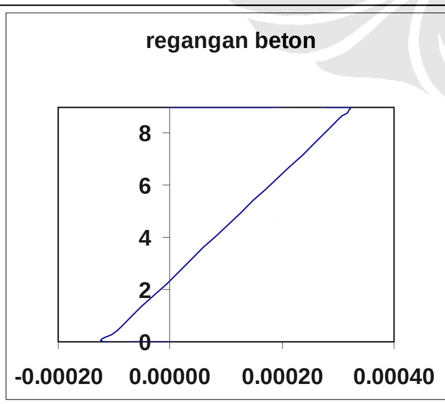
Retak awal Pada beton

P = 4,96 *Kips*

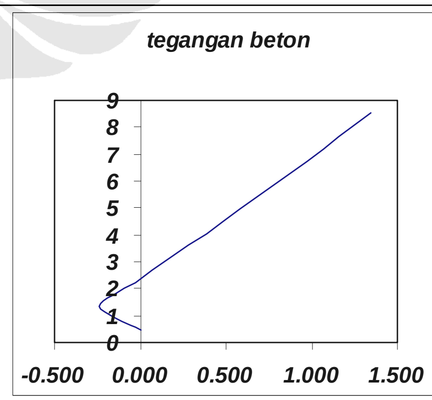
Lendutan = 0,065 Inch



Gambar D.9.1. Gaya dalam balok P3R3-3 pada retak awal



Grafik D.9.7. regangan beton balok P3R3-3 pada retak awal

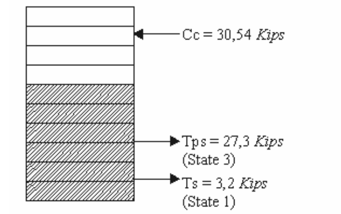


Grafik D.9.8. tegangan beton balok P3R3-3 pada retak awal

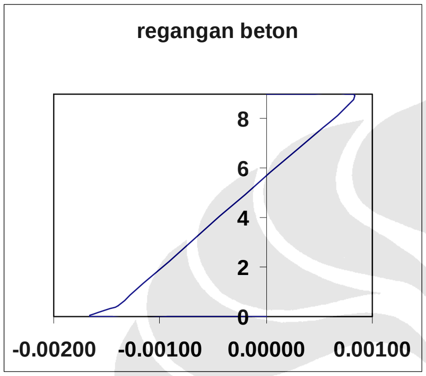
Leleh baja prategang dan ultimate

P = 8,02 *Kips*

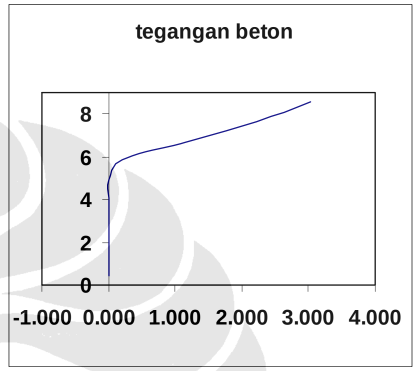
Lendutan = 0,35 Inch



Gambar D.9.2. Gaya dalam balok P3R3-3 pada ultimate

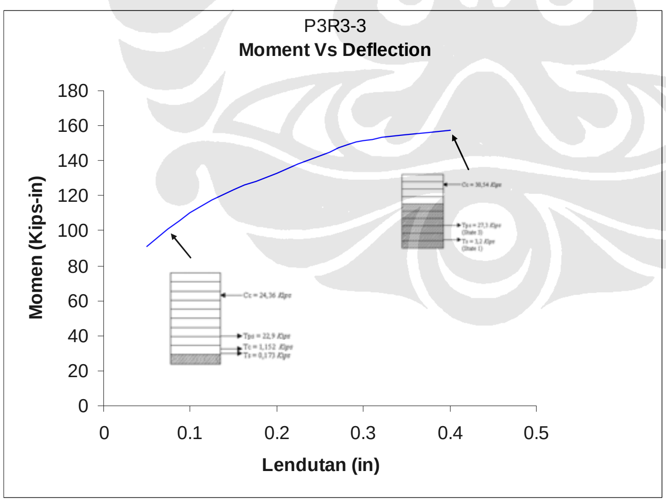


Grafik D.9.9. regangan beton balok P3R3-3 pada ultimate



Grafik D.9.10. tegangan beton balok P3R3-3 ultimate

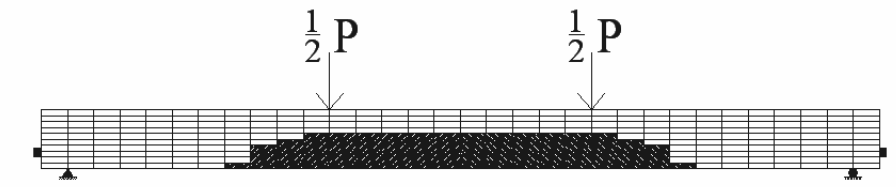
Tahapan Kerusakan Struktur



Grafik D.9.11. Momen vs lendutan tahapan kerusakan struktur balok P3R3-3

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

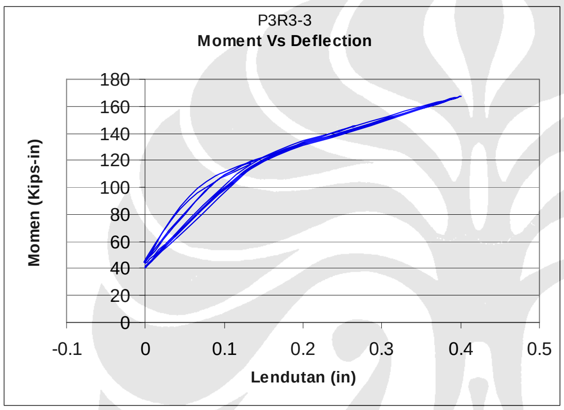
Retak pada beton pada saat ultimate



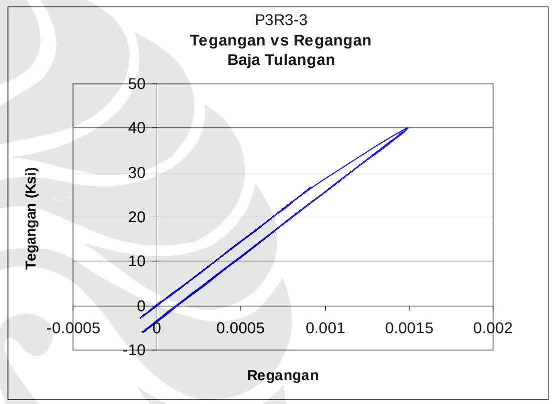
Gambar D.9.3. pola retak saat ultimate pada balok P3R3-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat geser

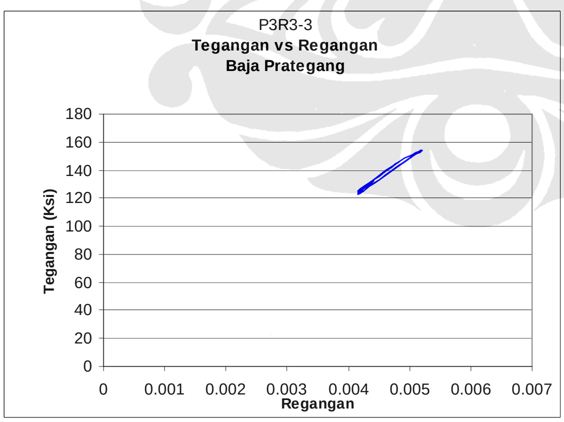
Beban Semi Siklik



Grafik D.9.12. Momen vs lendutan beban semi siklik balok P3R3-3



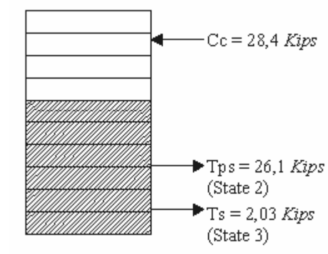
Grafik D.9.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P3R3-3



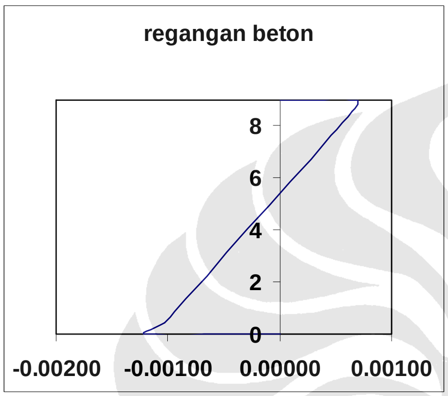
Grafik D.9.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P3R3-3

Kondisi Ultimate

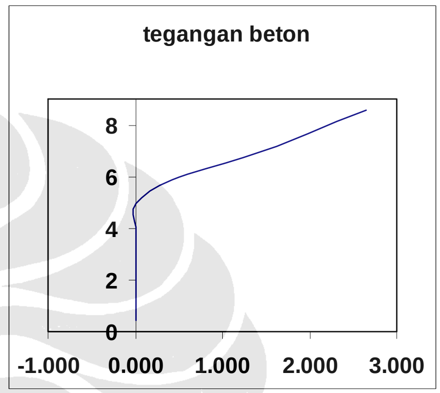
P	=	7,18	*Kips*
Lendutan	=	0,267	*Inch*



Gambar D.9.4. Gaya dalam balok P3R3-3 pada beban semi siklik



Grafik D.9.15. regangan beton beban semi siklik balok P2R3-0

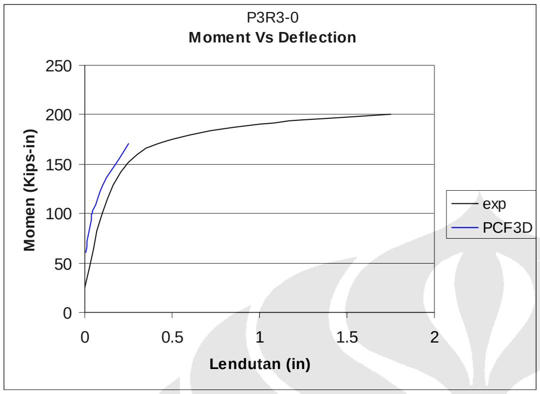


Grafik D.9.17. tegangan beton beban semi siklik balok P3R3-3

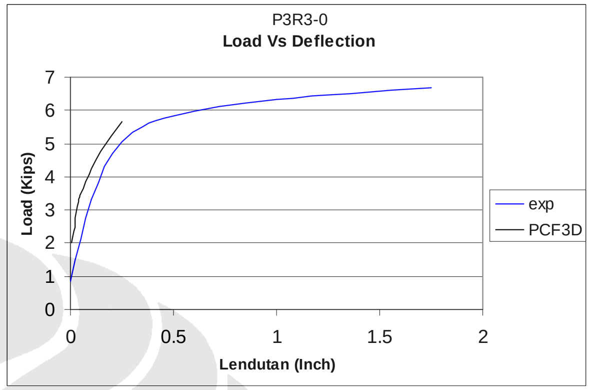
BALOK P3R3-0

Beban Monotomik

OUPUT



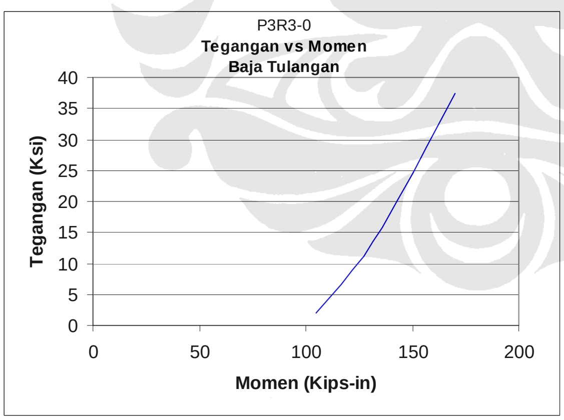
Grafik D.10.1. Momen vs lendutan control beban balok P3R3-0



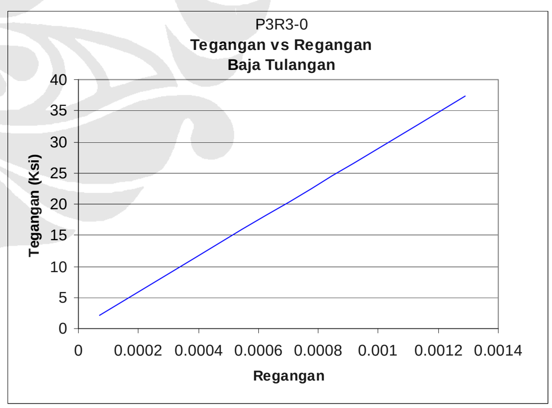
Grafik D.10.2. Beban vs lendutan control beban balok P3R3-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



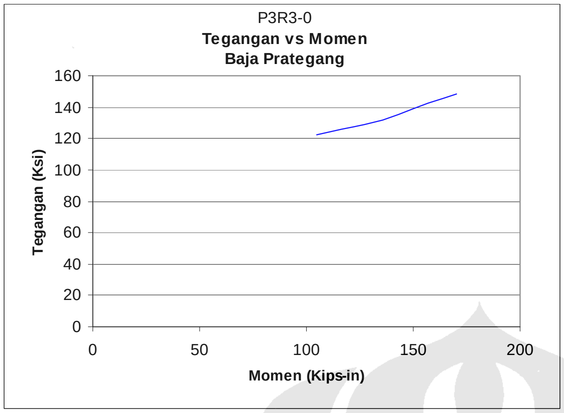
Grafik D.10.3. Tegangan baja tulangan vs momen control beban balok P3R3-0



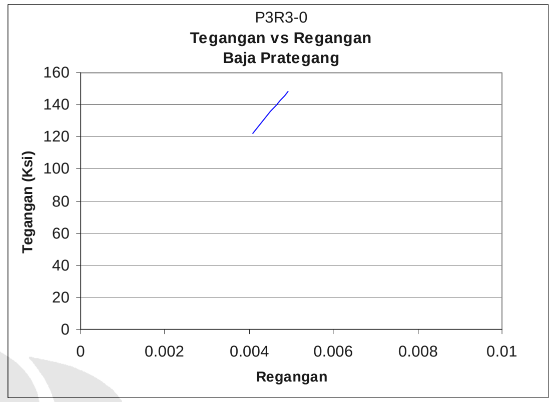
Grafik D.10.4. Tegangan vs regangan baja tulangan control beban balok P3R3-0

Tegangan baja yang terjadi meningkat seiring meningkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.10.5. Tegangan baja prategang vs momen control beban balok P3R3-0



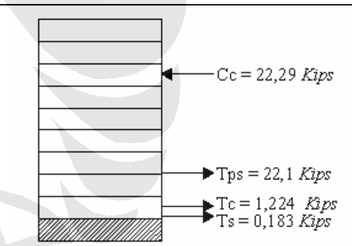
Grafik D.10.6. Tegangan vs regangan baja prategang control beban balok P3R3-0

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

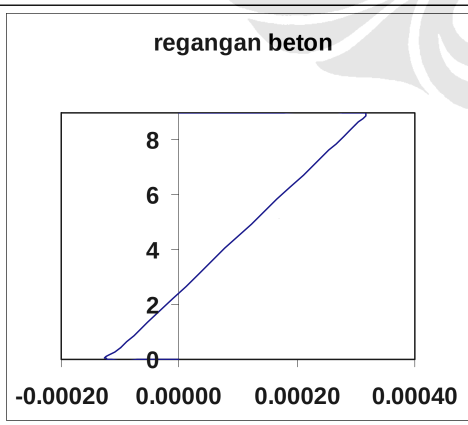
Retak awal Pada beton

P = 3,5 *Kips*

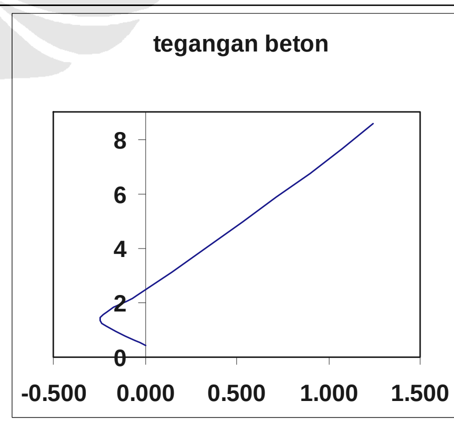
Lendutan = 0,05 Inch



Gambar D.10.1. Gaya dalam balok P3R3-0 pada retak awal



Grafik D.10.7. regangan beton balok P3R3-0 pada retak awal

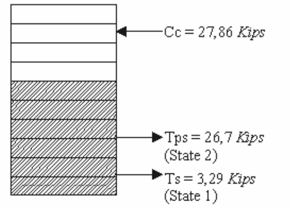


Grafik D.10.8. tegangan beton balok P3R3-0 pada retak awal

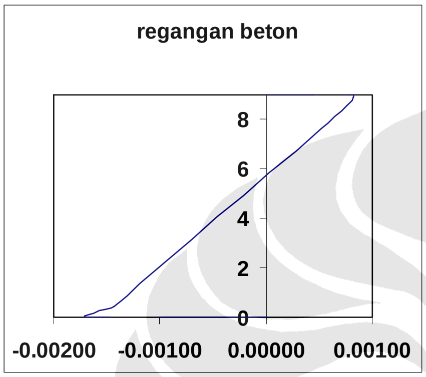
Ultimate

P = 5,67 *Kips*

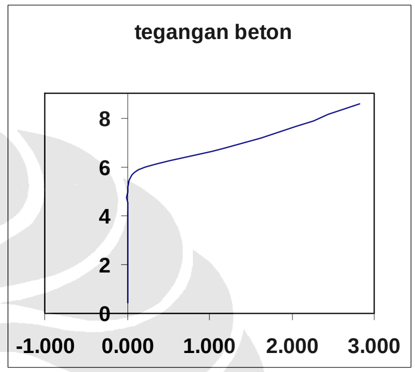
Lendutan = 0,25 Inch



Gambar D.10.2. Gaya dalam balok P3R3-0 pada ultimate

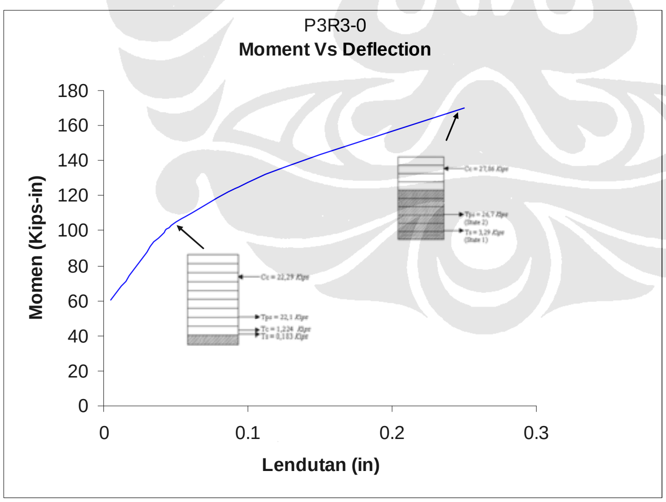


Grafik D.10.9. regangan beton balok P3R3-0 pada ultimate



Grafik D.10.10. tegangan beton balok P3R3-0 ultimate

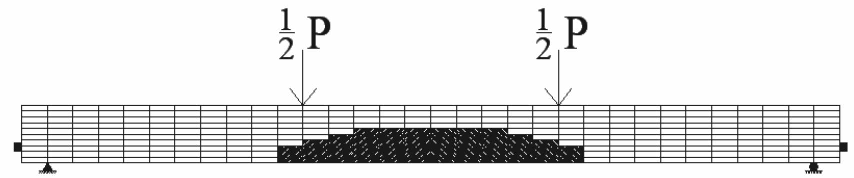
Tahapan Kerusakan Struktur



Grafik D.10.11. Momen vs lendutan tahapan kerusakan struktur balok P3R3-0

Terlihat pada saat kegagalan baja tulangan dan baja prategangnbelum mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

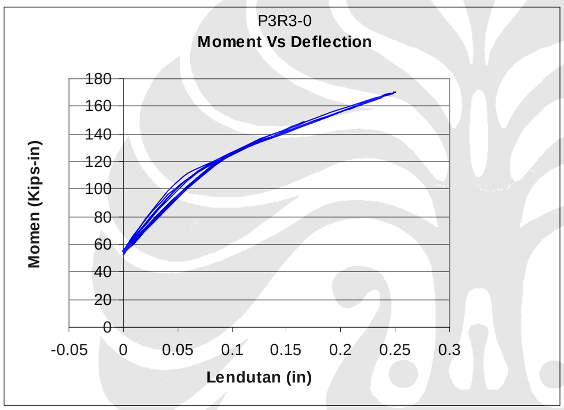
Retak pada beton pada saat ultimate



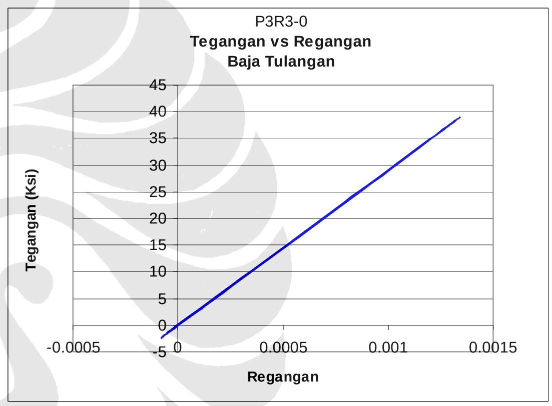
Gambar D.10.3. pola retak saat ultimate pada balok P3R3-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

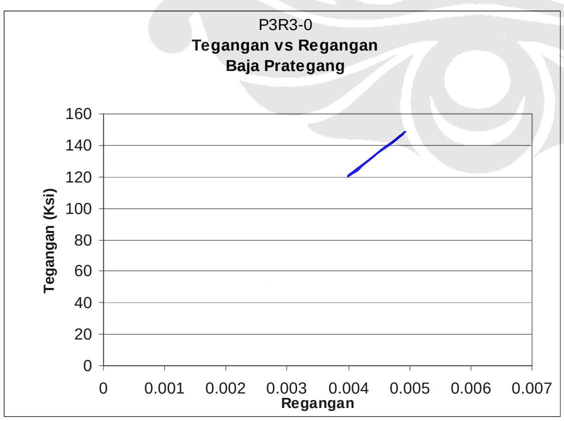
Beban Semi Siklik



Grafik D.10.12. Momen vs lendutan beban semi siklik P3R3-0



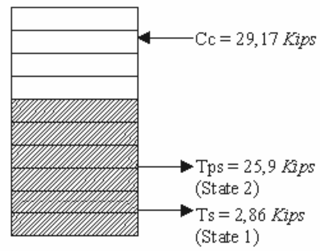
Grafik D.10.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P3R3-0



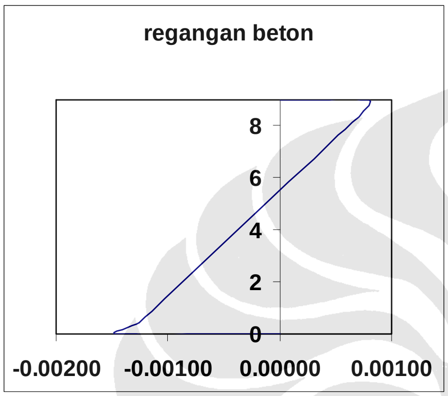
Grafik D.10.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P3R3-0

Kondisi Ultimate

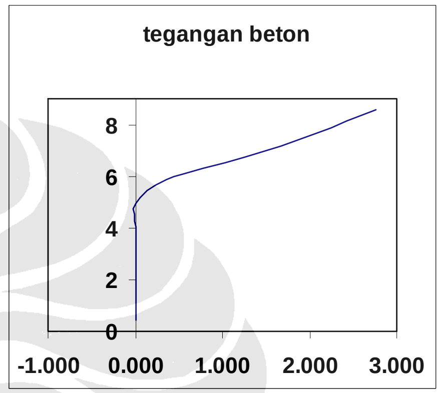
P	=	5,32	*Kips*
Lendutan	=	0,213	*Inch*



Gambar D.10.4. Gaya dalam balok P3R3-0 pada beban semi siklik



Grafik D.10.15. regangan beton beban semi siklik balok P2R3-0

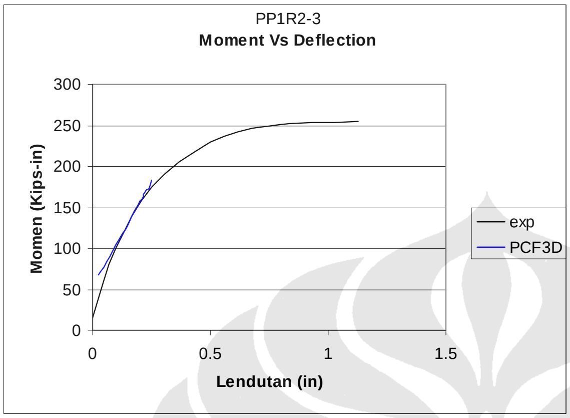


Grafik D.10.17. tegangan beton beban semi siklik balok P3R3-0

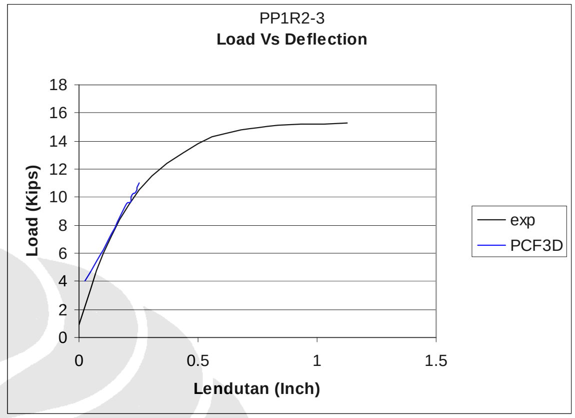
BALOK PP1R2-3

Beban Monotomik

OUPUT



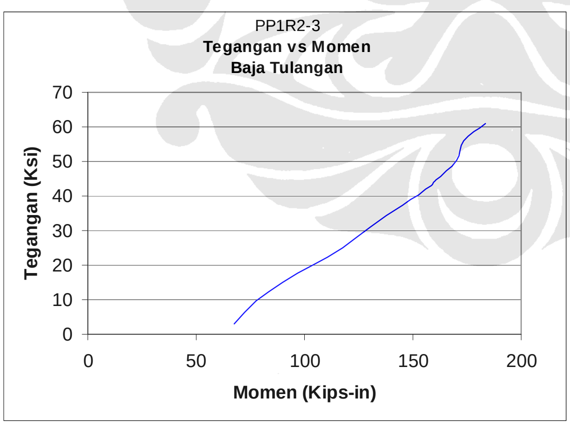
Grafik D.11.1. Momen vs lendutan kontrol beban balok PP1R2-3



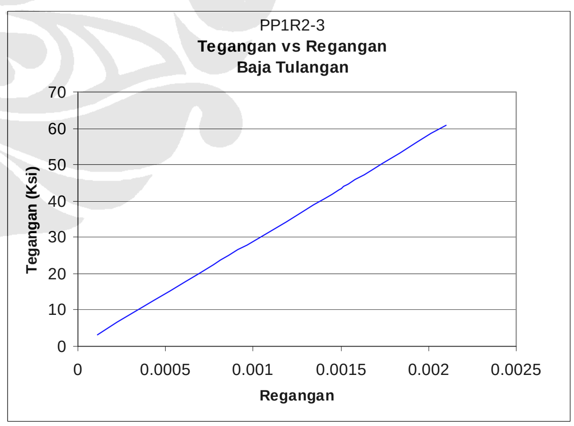
Grafik D.11.2. Beban vs lendutan kontrol beban balok PP1R2-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



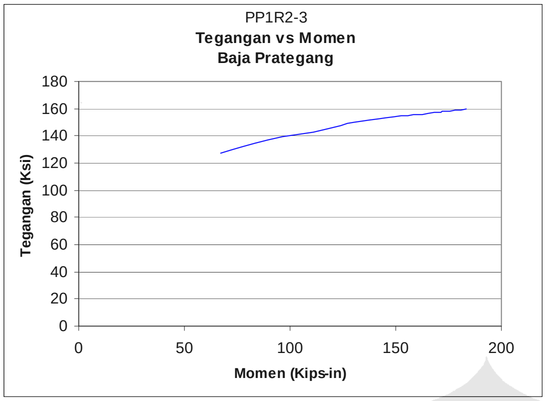
Grafik D.11.3. Tegangan baja tulangan vs momen kontrol beban balok PP1R2-3



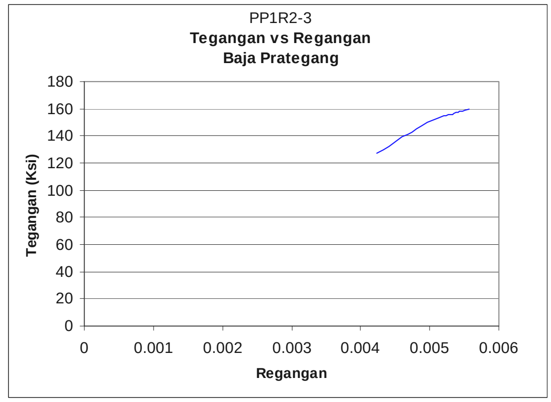
Grafik D.11.4. Tegangan vs regangan baja tulangan kontrol beban balok PP1R2-3

Tegangan baja yang terjadi meningkat seiring meningkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.11.5. Tegangan baja prategang vs momen kontrol beban balok PP1R2-3



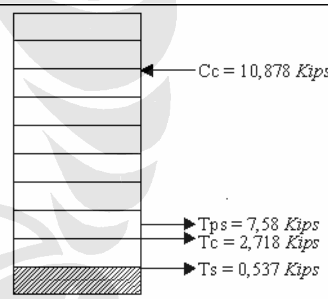
Grafik D.11.6. Tegangan vs regangan baja pratengang kontrol beban balok PP1R2-3

Tegangan baja prategang yang terjadi meningkat seiring meningkatnya momen yang terjadi, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

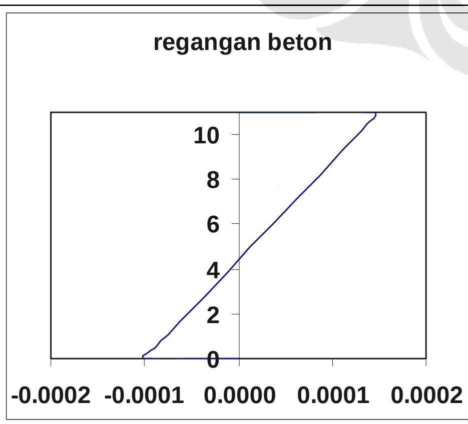
Retak awal Pada beton

P = 4,07 *Kips*

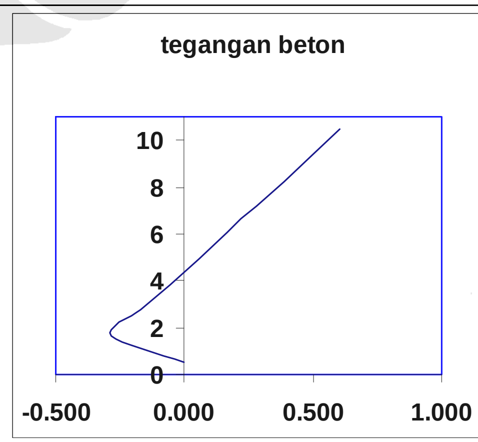
Lendutan = 0,021 Inch



Gambar D.11.1. Gaya dalam balok PP1R2-3 pada retak awal



Grafik D.11.7. regangan beton balok PP1R2-3 pada retak awal

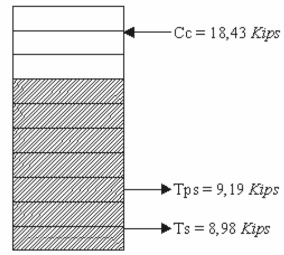


Grafik D.11.8. tegangan beton balok PP1R2-3 pada retak awal

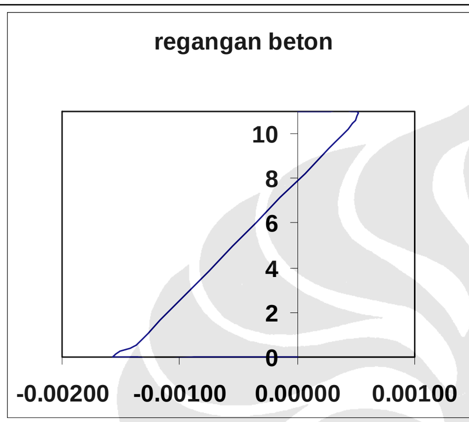
Leleh Pada Baja Prategang

P = 8,72 *Kips*

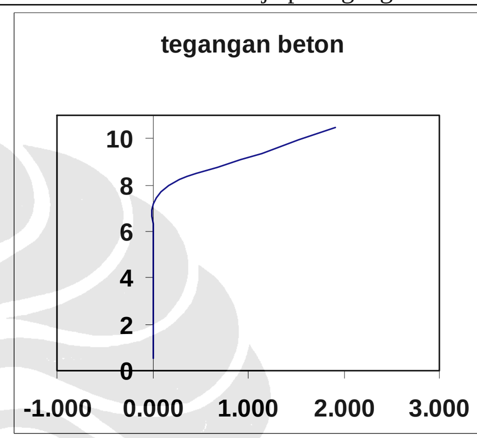
Lendutan = 0,175 Inch



Gambar D.11.2. Gaya dalam balok PP1R2-3 pada leleh baja prategang



Grafik D.11.9. regangan beton balok PP1R2-3 pada leleh baja prategang

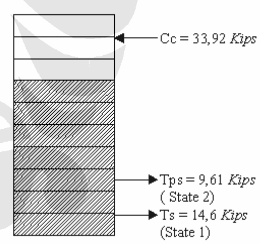


Grafik D.11.10. tegangan beton balok PP2R2-3 pada leleh baja prategang

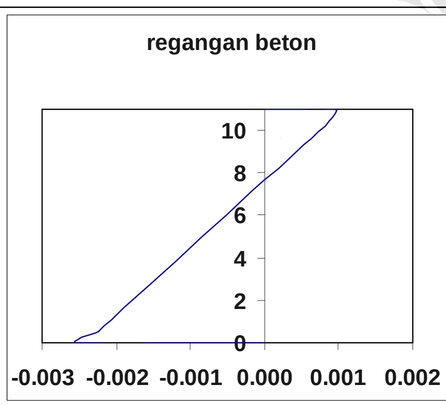
Ultimate

P = 11 *Kips*

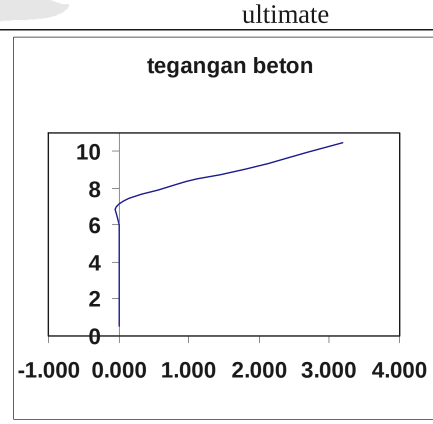
Lendutan = 0,25 Inch



Gambar D.11.3. Gaya dalam balok PP1R2-3 pada ultimate

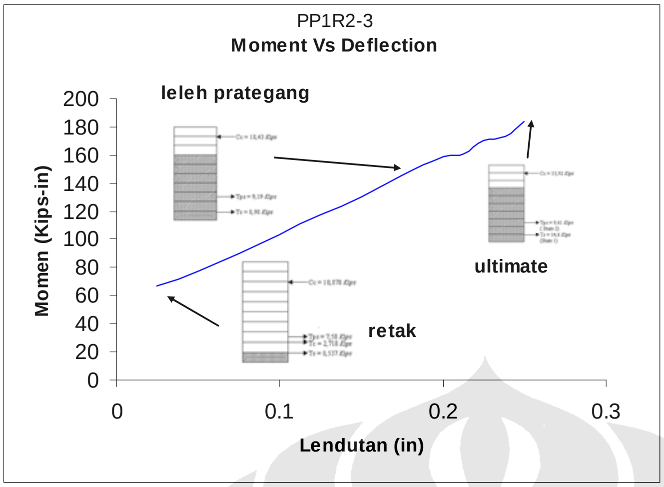


Grafik D.11.11. regangan beton balok PP1R2-3 pada ultimate



Grafik D.11.12. tegangan beton balok PP1R2-3 ultimate

Tahapan Kerusakan Struktur



Grafik D.11.13. Momen vs lendutan tahapan kerusakan struktur balok PP1R2-3

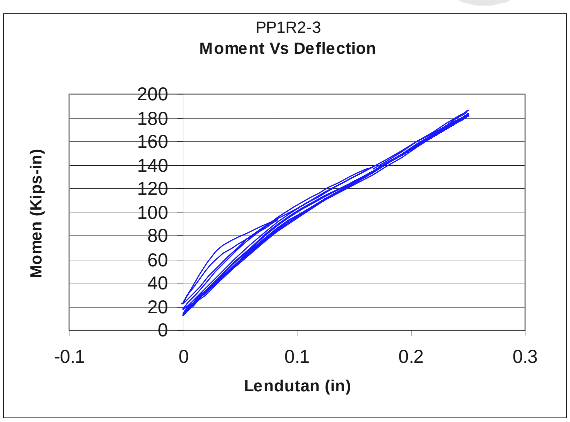
Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

Retak pada beton pada saat ultimate

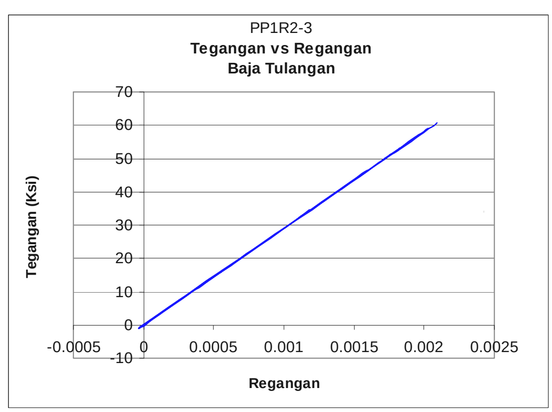
Gambar D.11.4. pola retak saat ultimate pada balok PP1R2-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

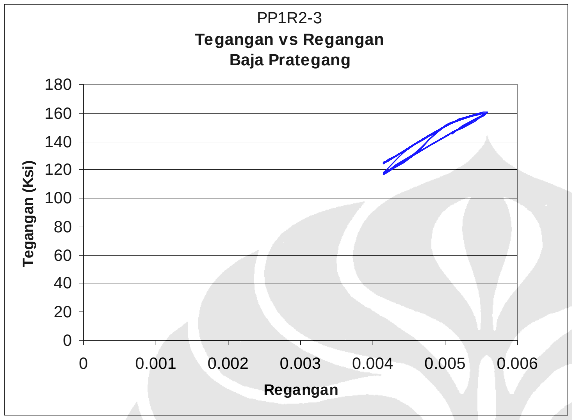


Grafik D.11.14. Momen vs lendutan beban semi siklik balok PP1R2-3



Grafik D.11.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP1R2-3

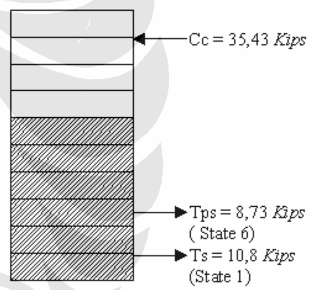
Tegangan vs Regangan Baja Prategang



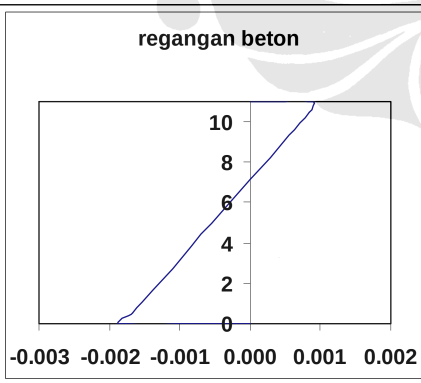
Grafik D.11.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP1R2-3

Kondisi Ultimate

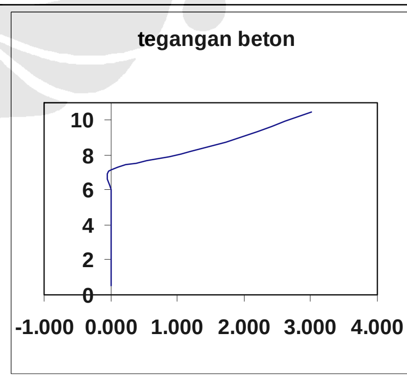
P	=	8,2	*Kips*
Lendutan	=	0,167	*Inch*



Gambar D.11.5. Gaya dalam balok PP1R2-3 pada beban semi siklik



Grafik D.11.17. regangan beton beban semi siklik balok PP1R2-3

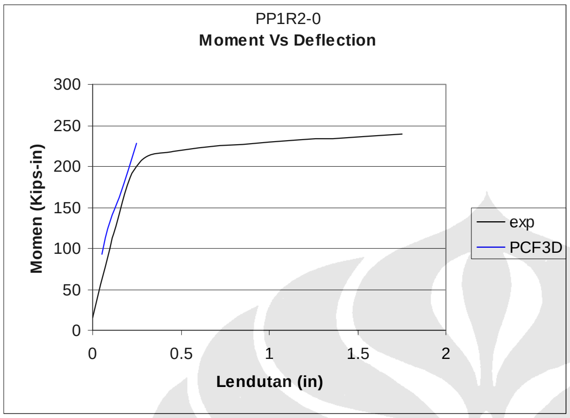


Grafik D.11.18. tegangan beton beban semi siklik balok PP1R2-3

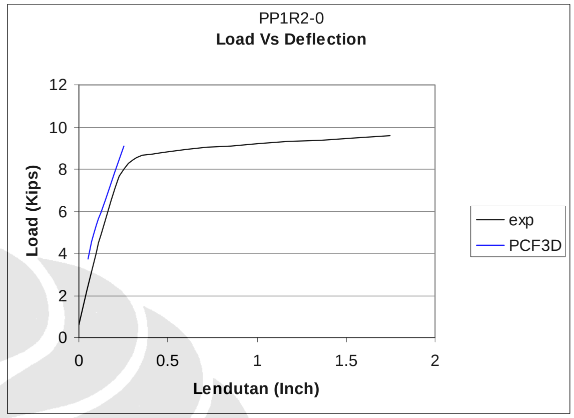
BALOK PP1R2-0

Beban Monotomik

OUPUT



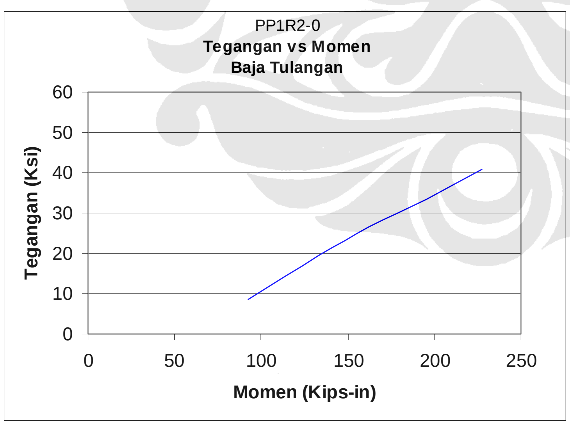
Grafik D.12.1. Momen vs lendutan control beban balok PP1R2-0



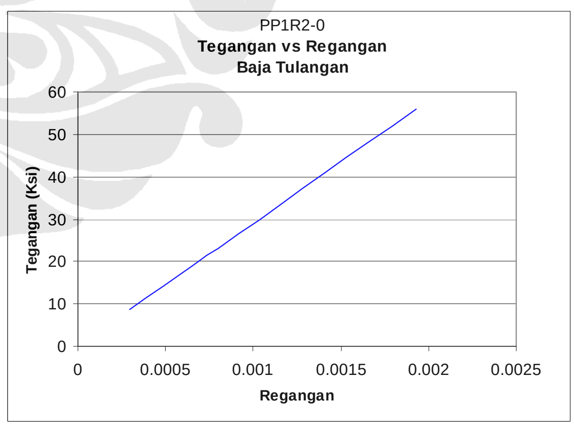
Grafik D.12.2. Beban vs lendutan control beban balok PP1R2-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



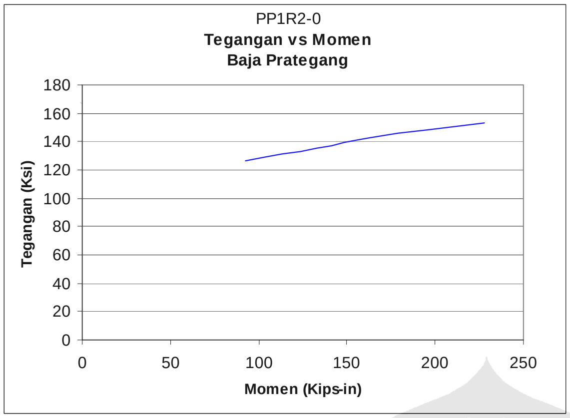
Grafik D.12.3. Tegangan baja tulangan vs momen control beban balok PP1R2-0



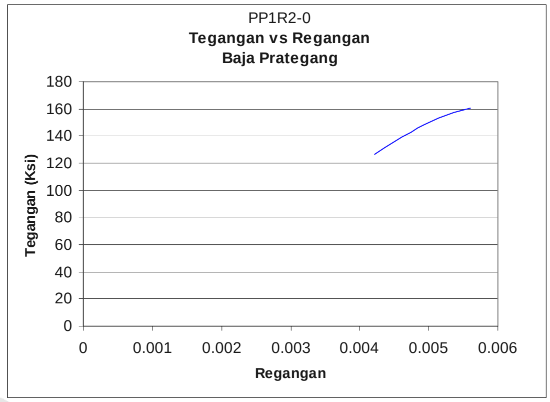
Grafik D.12.4. Tegangan vs regangan baja tulangan control beban balok PP1R2-0

Tegangan baja yang terjadi meningkat seiring menigkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.12.5. Tegangan baja prategang vs momen control beban balok PP1R2-0



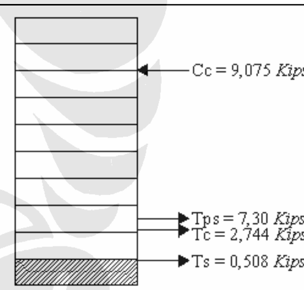
Grafik D.12.6. Tegangan vs regangan baja pratengang control beban balok PP1R2-0

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

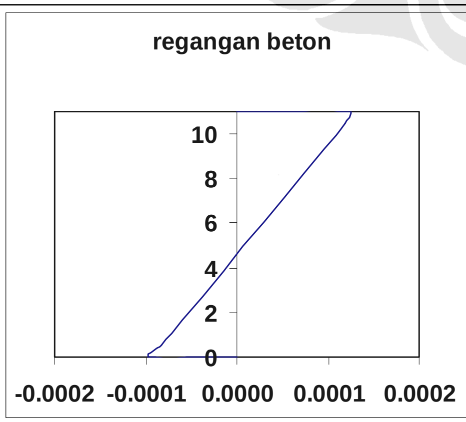
Retak awal Pada beton

P = 2,92 *Kips*

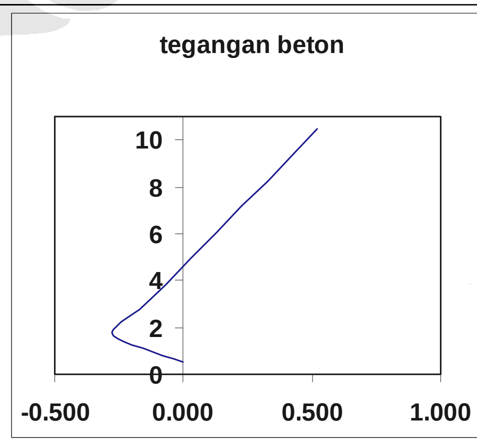
Lendutan = 0,0175 Inch



Gambar D.12.1. Gaya dalam balok PP1R2-0 pada retak awal



Grafik D.12.7. regangan beton balok PP1R2-0 pada retak awal

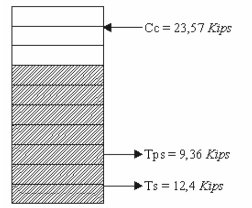


Grafik D.12.8. tegangan beton balok PP1R2-0 pada retak awal

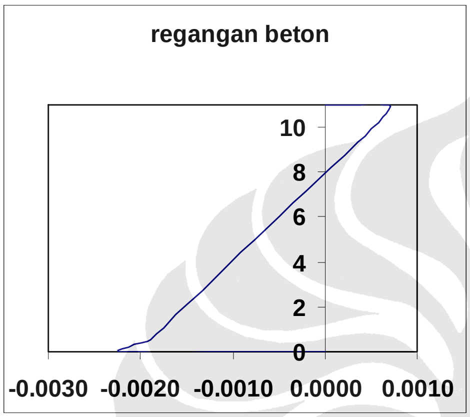
Leleh Pada Baja Prategang

P = 7,83*Kips*

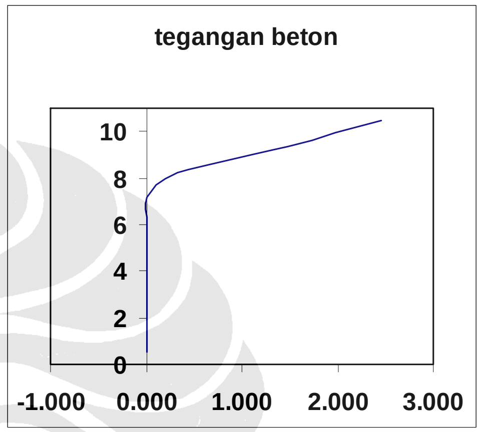
Lendutan = 0,2 Inch



Gambar D.12.2. Gaya dalam balok PP1R2-0 pada leleh baja prategang



Grafik D.12.9. regangan beton balok PP1R2-0 pada leleh baja prategang

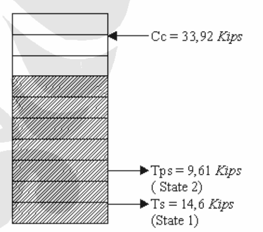


Grafik D.12.10. tegangan beton balok PP2R2-0 pada leleh baja prategang

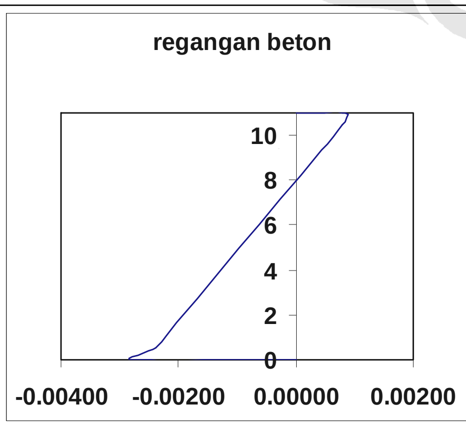
Ultimate

P = 9,1 *Kips*

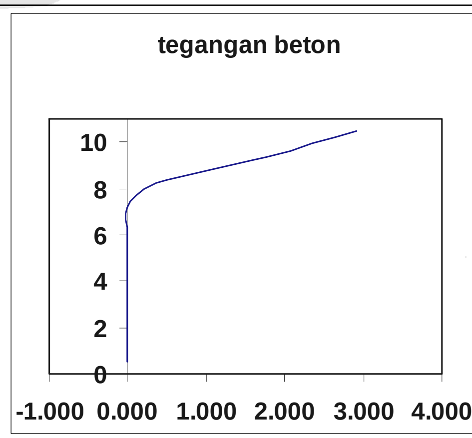
Lendutan = 0,25 Inch



Gambar D.12.3. Gaya dalam balok PP1R2-0 pada ultimate

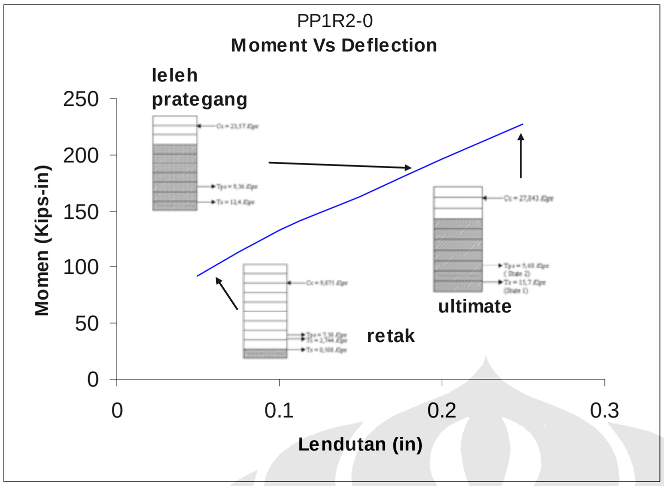


Grafik D.12.11. regangan beton balok PP1R2-0 pada ultimate



Grafik D.12.12. tegangan beton balok PP1R2-0 ultimate

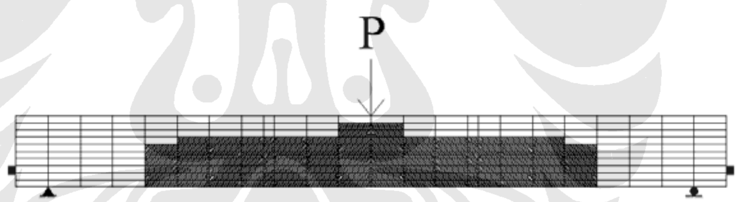
Tahapan Kerusakan Struktur



Grafik D.12.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP1R2-0

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

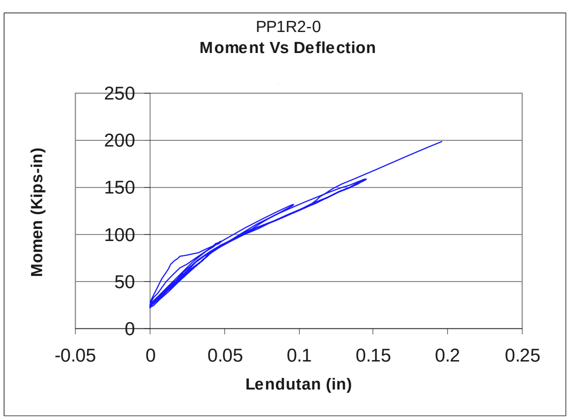
Retak pada beton pada saat ultimate



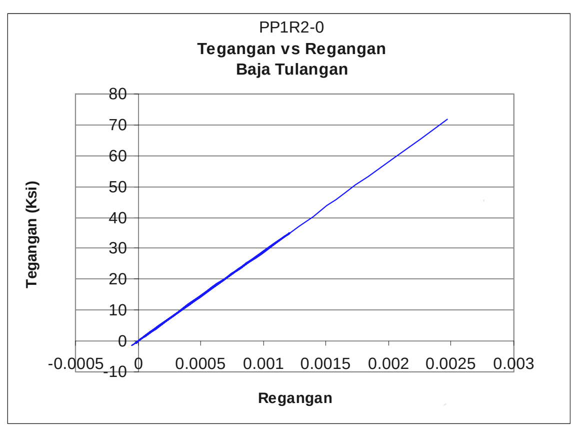
Gambar D.12.4. pola retak saat ultimate pada balok PP1R2-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

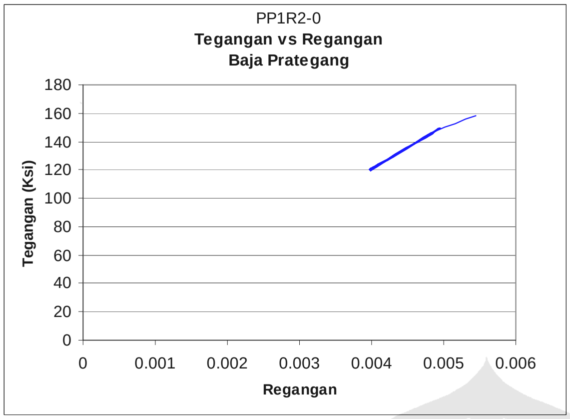


Grafik D.12.14. Momen vs lendutan beban semi siklik balok PP1R2-0



Grafik D.12.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP1R2-0

Tegangan vs Regangan Baja Prategang

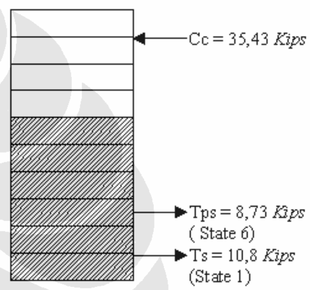


Grafik D.12.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP1R2-0

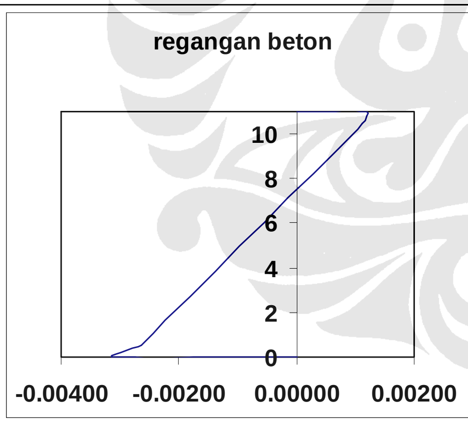
Kondisi Ultimate

P = 7,92 *Kips*

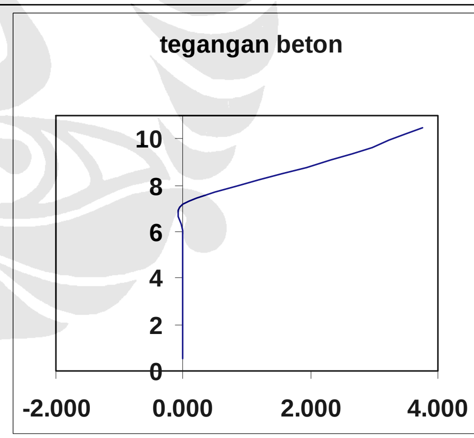
Lendutan = 0,196 *Inch*



Gambar D.12.5. Gaya dalam balok PP1R2-0 pada ultimate



Grafik D.12.17. regangan beton beban semi siklik balok PP1R2-0

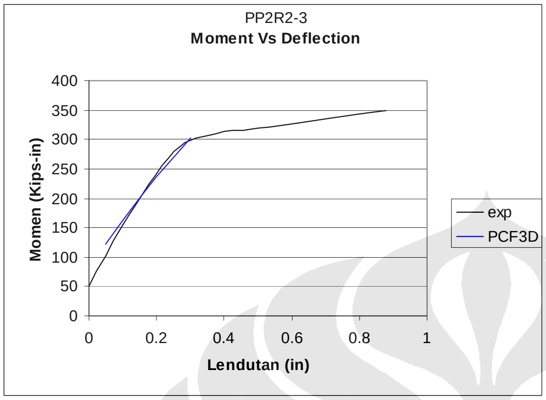


Grafik D.12.18. tegangan beton beban semi siklik balok PP1R2-0

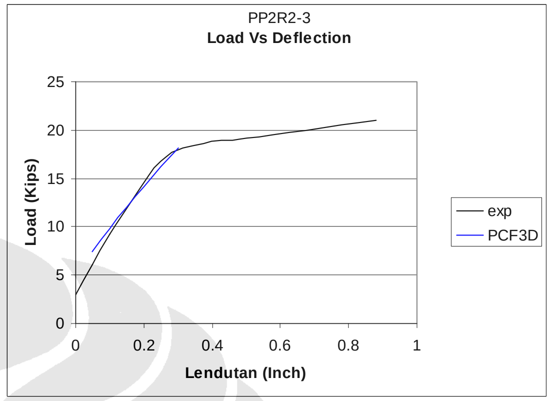
BALOK PP2R2-3

Beban Monotomik

OUPUT



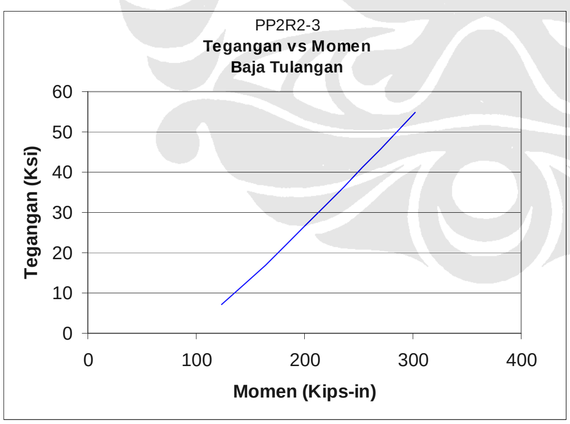
Grafik D.13.1. Momen vs lendutan control beban balok PP2R2-3



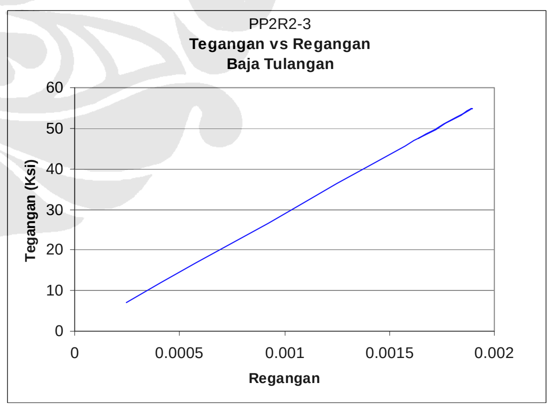
Grafik D.13.2. Beban vs lendutan control beban balok PP2R2-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



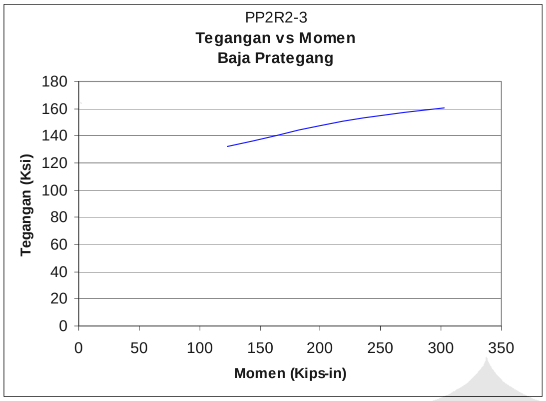
Grafik D.13.3. Tegangan baja tulangan vs momen control beban balok PP2R2-3



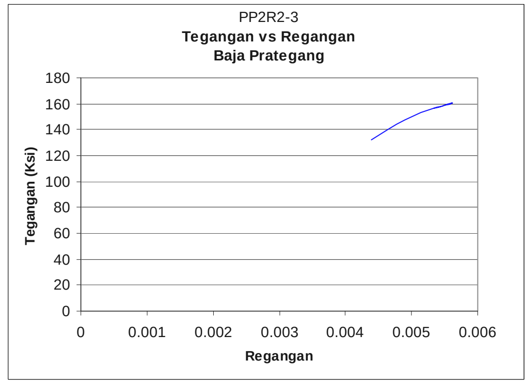
Grafik D.13.4. Tegangan vs regangan baja tulangan control beban balok PP2R2-3

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.13.5. Tegangan baja prategang vs momen control beban balok PP2R2-3



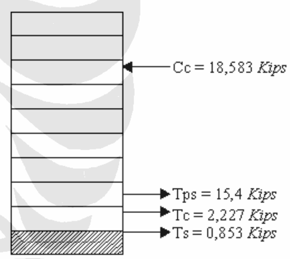
Grafik D.13.6. Tegangan vs regangan baja pratengang control beban balok PP2R2-3

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak, tterlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

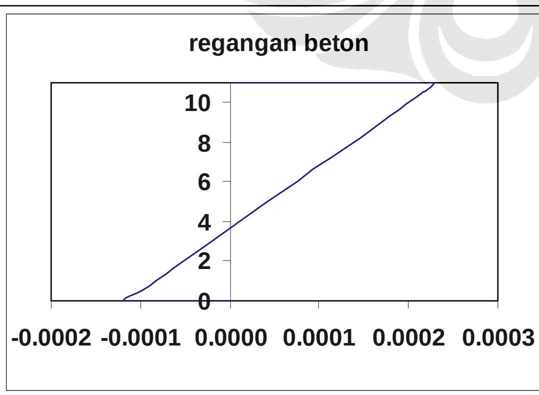
Retak awal Pada beton

P = 6,62 *Kips*

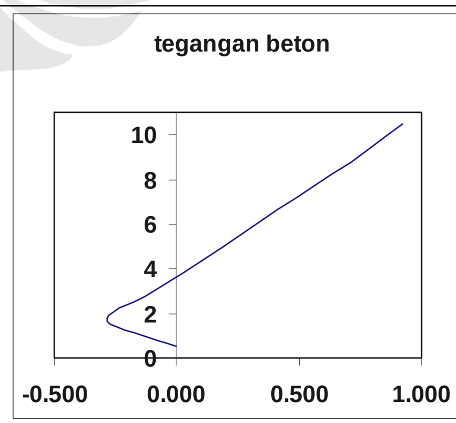
Lendutan = 0,035 Inch



Gambar D.13.1. Gaya dalam balok PP2R2-3 pada retak awal



Grafik D.13.7. regangan beton balok PP2R2-3 pada retak awal

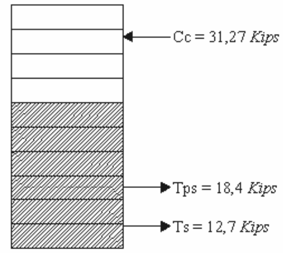


Grafik D.13.8. tegangan beton balok PP2R2-3 pada retak awal

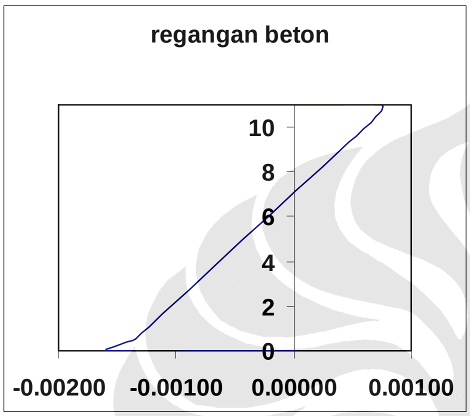
Leleh Pada Baja Prategang

P = 14,2 *Kips*

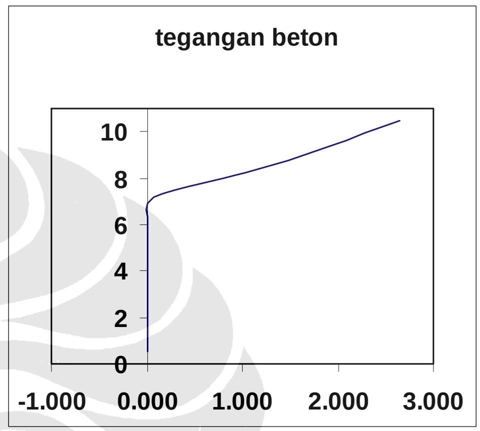
Lendutan = 0,02 Inch



Gambar D.13.2. Gaya dalam balok PP2R2-3 pada leleh baja prategang



Grafik D.13.9. regangan beton balok PP2R2-3 pada leleh baja prategang

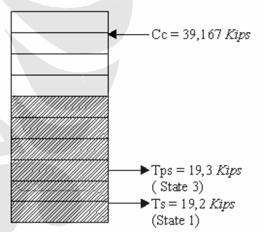


Grafik D.13.10. tegangan beton balok PP2R2-3 pada leleh baja prategang

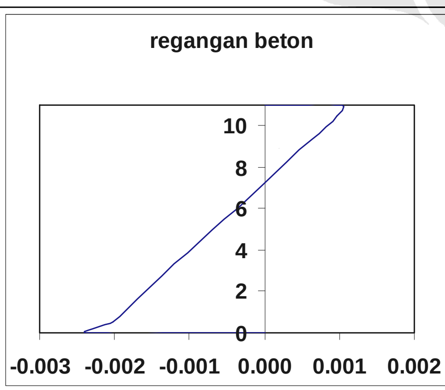
Ultimate

P = 18,1 *Kips*

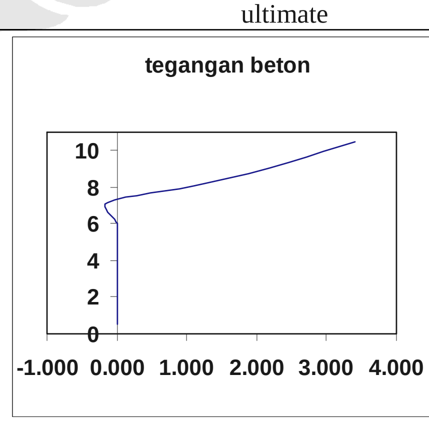
Lendutan = 0,3 Inch



Gambar D.13.3. Gaya dalam balok PP2R2-3 pada ultimate

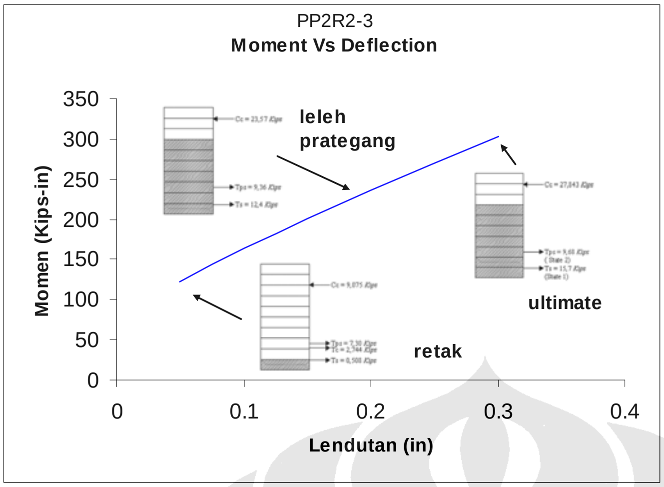


Grafik D.13.11. regangan beton balok PP2R2-3 pada ultimate



Grafik D.13.12. tegangan beton balok PP2R2-3 ultimate

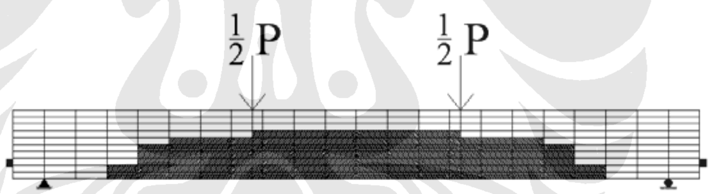
Tahapan Kerusakan Struktur



Grafik D.13.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP2R2-3

terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru pada tahapan leleh dan kegagalan yang terjadi akibat Matriks kekakuan struktur yang menjadi tidak stabil.

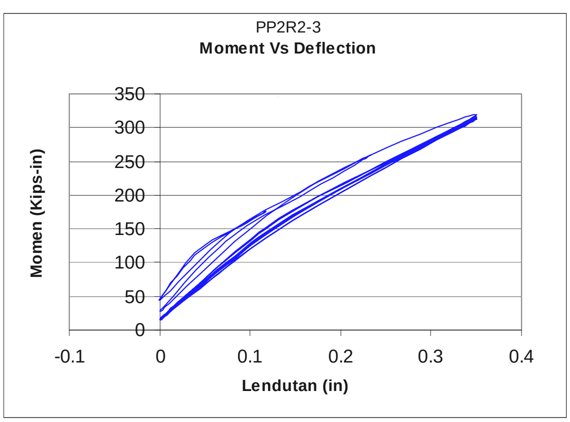
Retak pada beton pada saat ultimate



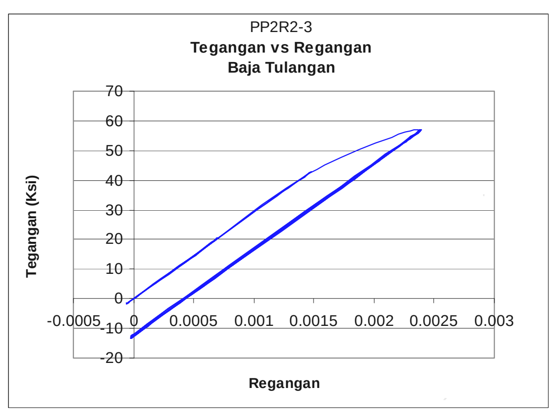
Gambar D.13.4. pola retak saat ultimate pada balok PP2R2-3

terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

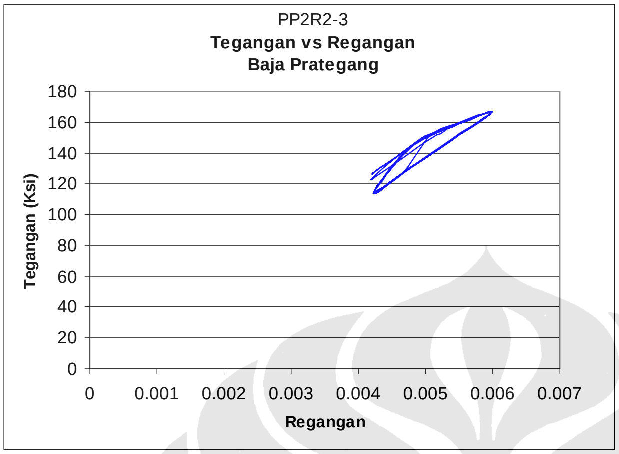


Grafik D.13.14. Momen vs lendutan beban semi siklik balok PP2R2-3



Grafik D.13.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP2R2-3

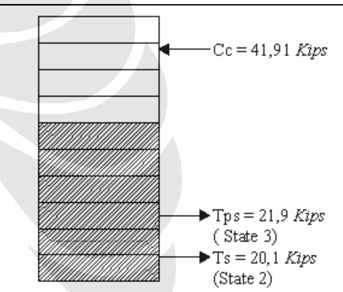
Tegangan vs Regangan Baja Prategang



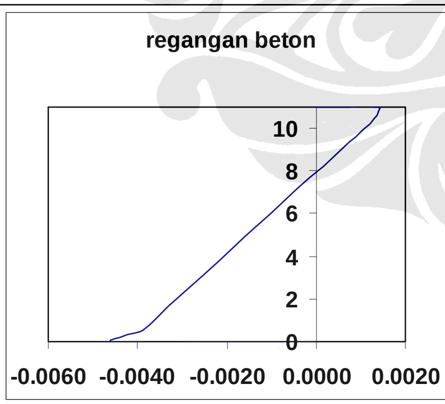
Grafik D.13.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP2R2-3

Kondisi Ultimate

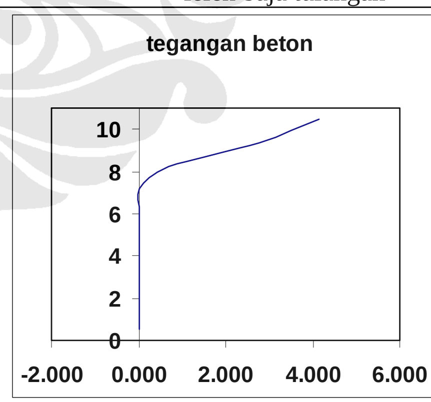
P	=	20	*Kips*
Lendutan	=	0,473	*Inch*



Gambar D.13.5. Gaya dalam balok PP2R2-3 pada leleh baja tulangan



Grafik D.13.17. regangan beton beban semi siklik balok PP2R2-3

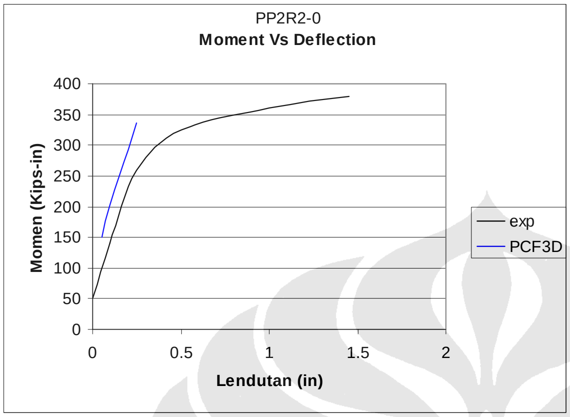


Grafik D.13.18. tegangan beton beban semi siklik balok PP2R2-3

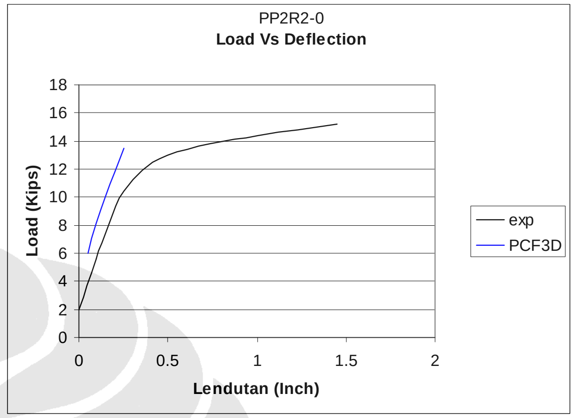
BALOK PP2R2-0

Beban Monotomik

OUPUT



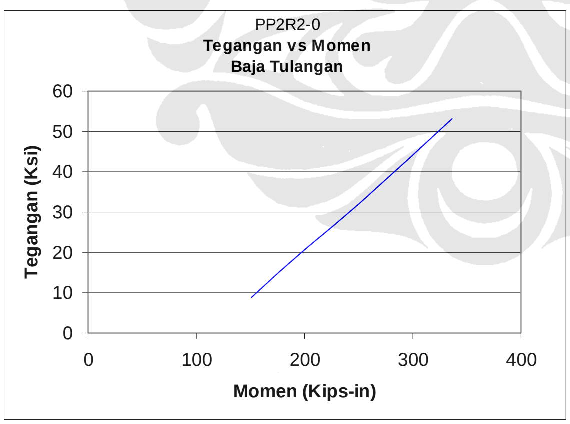
Grafik D.14.1. Momen vs lendutan control beban balok PP2R2-0



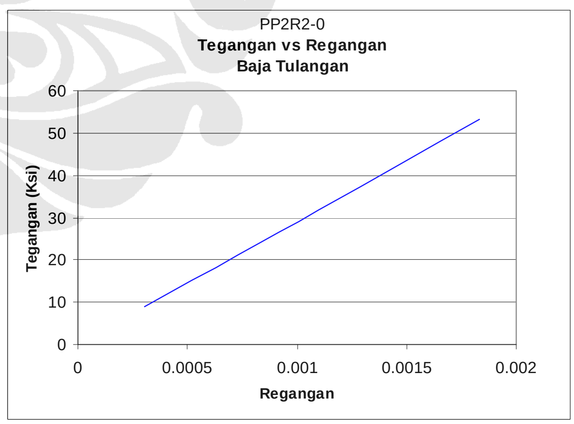
Grafik D.14.2. Beban vs lendutan control beban balok PP2R2-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



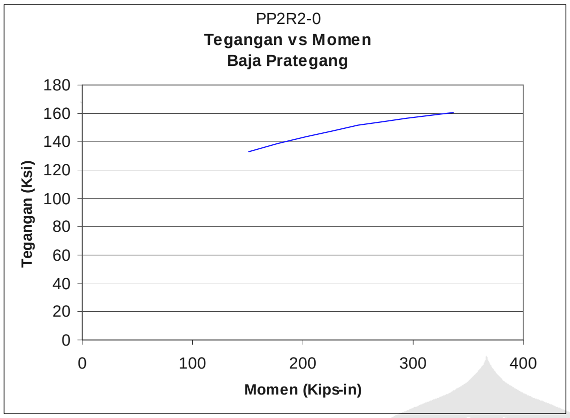
Grafik D.14.3. Tegangan baja tulangan vs momen control beban balok PP2R2-0



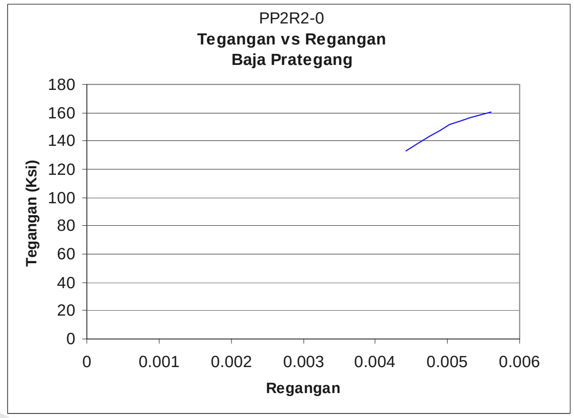
Grafik D.14.4. Tegangan vs regangan baja tulangan control beban balok PP2R2-0

Tegangan baja yang terjadi meningkat seiring dengan meningkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.14.5. Tegangan baja prategang vs momen control beban balok PP2R2-0



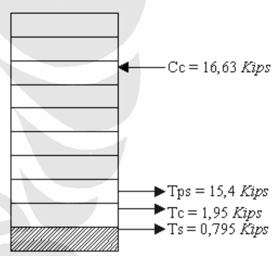
Grafik D.14.6. Tegangan vs regangan baja pratengang control beban balok PP2R2-0

Tegangan baja yang terjadi meningkat seiring dengan meningkatnya momen yang terjadi, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

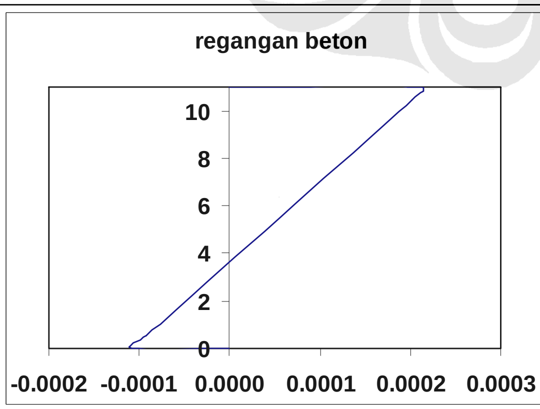
Retak awal Pada beton

P = 4,89 *Kips*

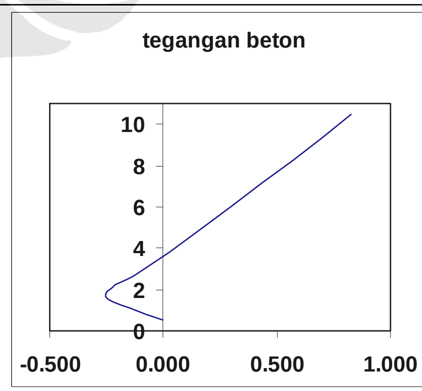
Lendutan = 0,025 Inch



Gambar D.14.1. Gaya dalam balok PP2R2-0 pada retak awal



Grafik D.14.7. regangan beton balok PP2R2-0 pada retak awal

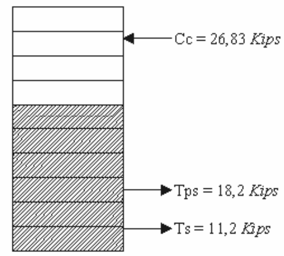


Grafik D.14.8. tegangan beton balok PP2R2-0 pada retak awal

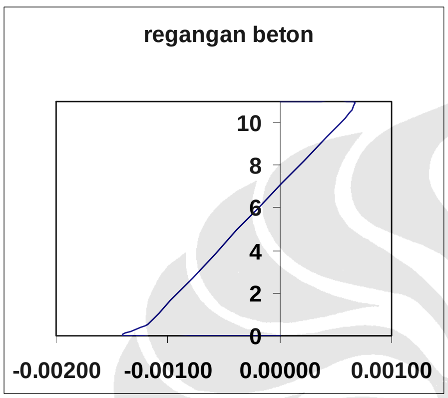
Leleh Pada Baja Prategang

P = 9,99 *Kips*

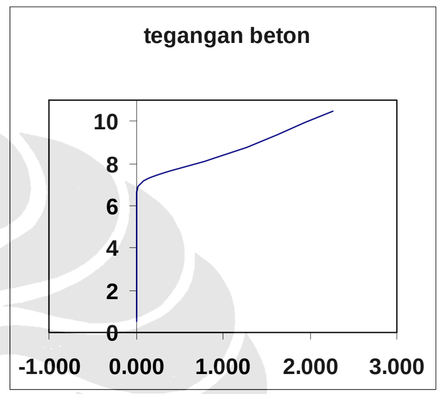
Lendutan = 0,15 Inch



Gambar D.14.2. Gaya dalam balok PP2R2-0 pada leleh baja prategang



Grafik D.14.9. regangan beton balok PP2R2-0 pada leleh baja prategang

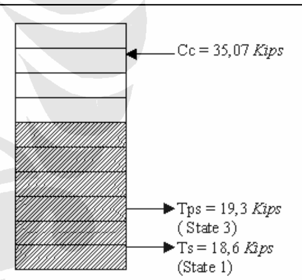


Grafik D.14.10. tegangan beton balok PP2R2-0 pada leleh baja prategang

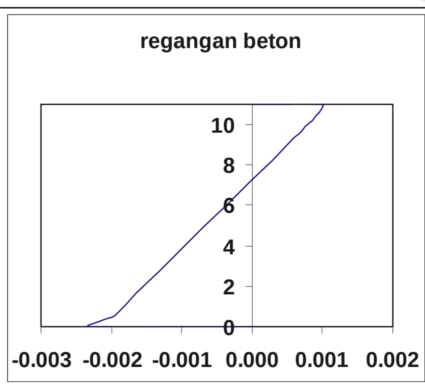
Ultimate

P = 13,4 *Kips*

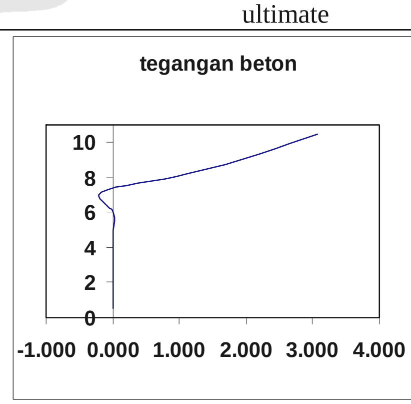
Lendutan = 0,025 Inch



Gambar D.14.3. Gaya dalam balok PP2R2-0 pada ultimate

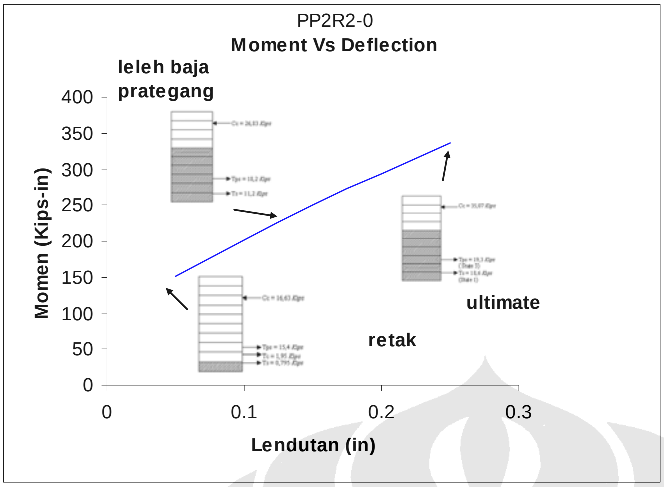


Grafik D.14.11. regangan beton balok PP2R2-0 pada ultimate



Grafik D.14.12. tegangan beton balok PP2R2-0 ultimate

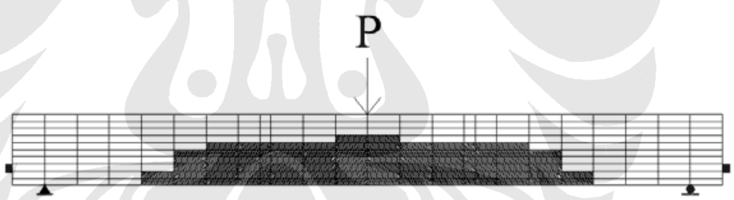
Tahapan Kerusakan Struktur



Grafik D.14.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP2R2-0

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru pada tahap leleh dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

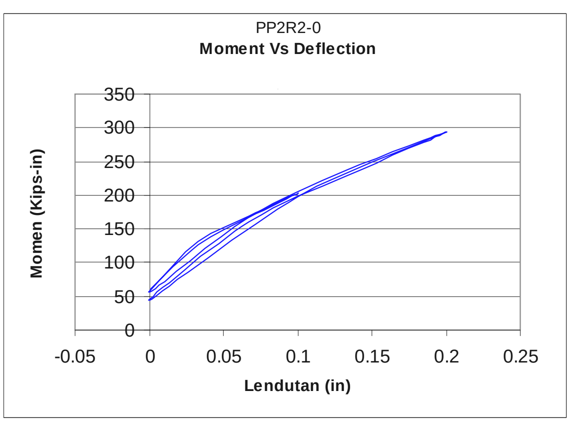
Retak pada beton pada saat ultimate



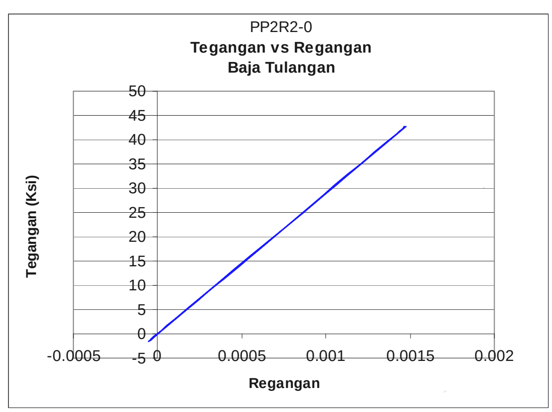
Gambar D.14.4. pola retak saat ultimate pada balok PP2R2-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

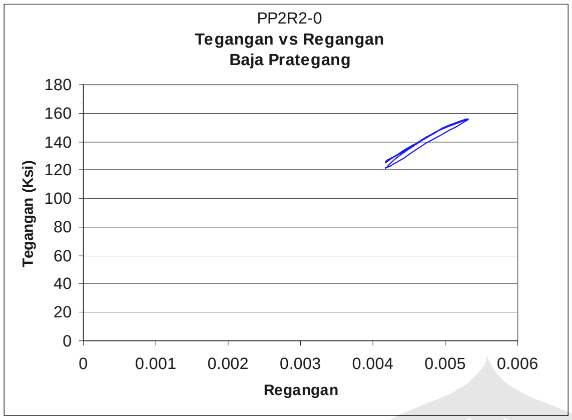


Grafik D.14.14. Momen vs lendutan beban semi siklik balok PP2R2-0



Grafik D.14.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP2R2-0

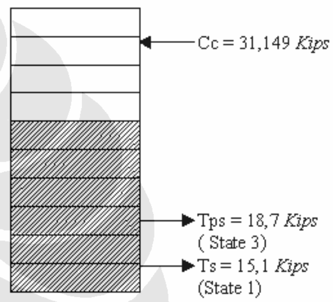
Tegangan vs Regangan Baja Prategang



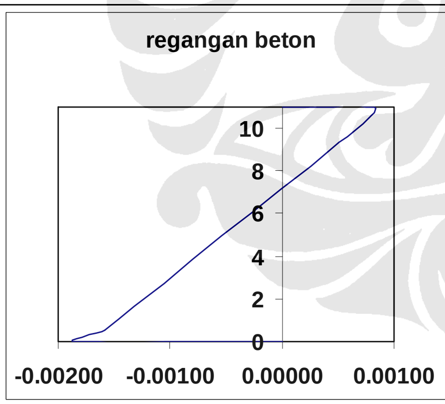
Grafik D.14.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP2R2-0

Kondisi Ultimate

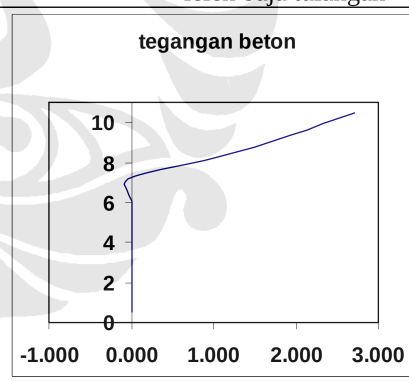
P	=	11,7	*Kips*
Lendutan	=	0,2	*Inch*



Gambar D.14.5. Gaya dalam balok PP2R2-0 pada leleh baja tulangan



Grafik D.14.17. regangan beton beban semi siklik balok PP2R2-0

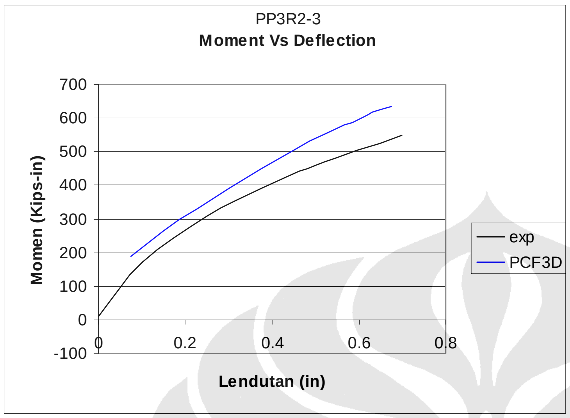


Grafik D.14.18. tegangan beton beban semi siklik balok PP2R2-0

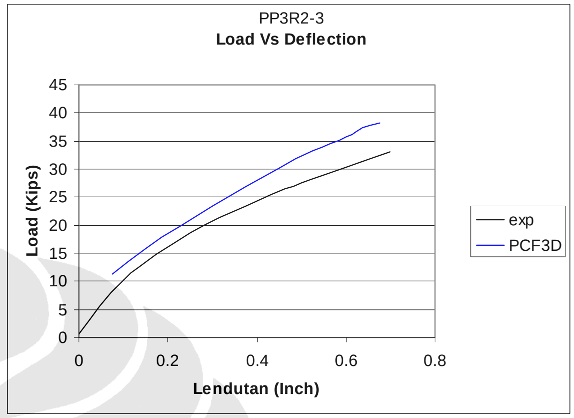
BALOK PP3R2-3

Beben Monotomik

OUPUT



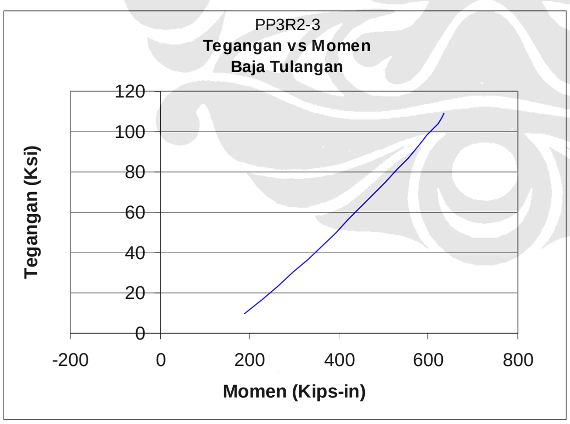
Grafik D.15.1. Momen vs lendutan control beban balok PP3R2-3



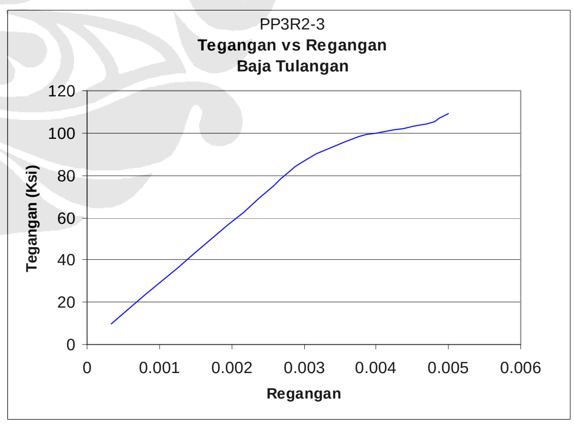
Grafik D.15.2. Beban vs lendutan control beban balok PP3R2-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



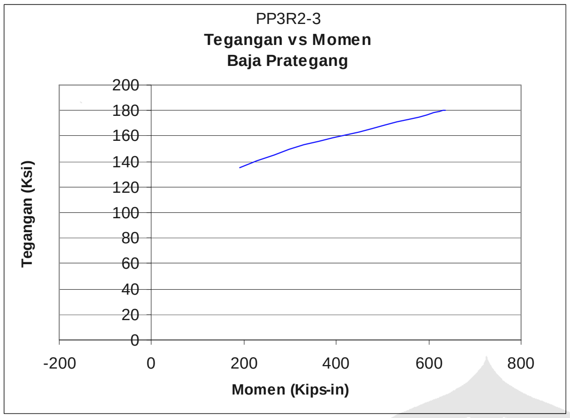
Grafik D.15.3. Tegangan baja tulangan vs momen control beban balok PP3R2-3



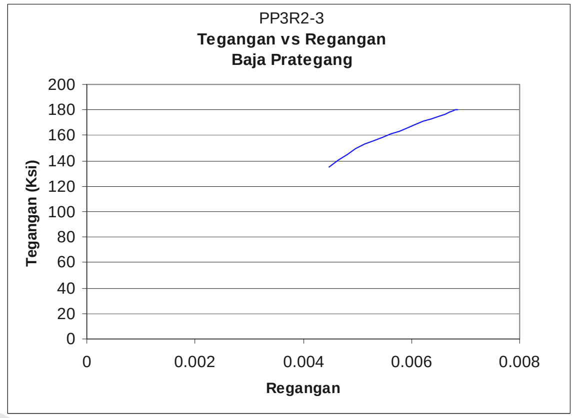
Grafik D.15.4. Tegangan vs regangan baja tulangan control beban balok PP3R2-3

Tegangan baja yang terjadi meningkat seiring meningkatnya momen yang terjadi, terlihat bahwa baja tulangan pada tahapan leleh pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.15.5. Tegangan baja prategang vs momen control beban balok PP3R2-3



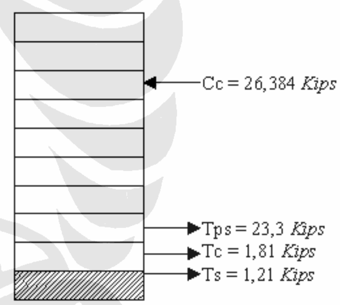
Grafik D.15.6. Tegangan vs regangan baja pratengang control beban balok PP3R2-3

Tegangan baja yang terjadi meningkat seiring meningkatnya momen yang terjadi, terlihat bahwa baja prategang pada tahap leleh pada saat struktur mengalami kegagalan

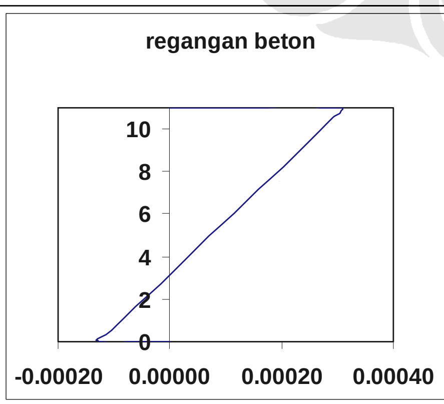
Retak awal Pada beton

P = 9,08 *Kips*

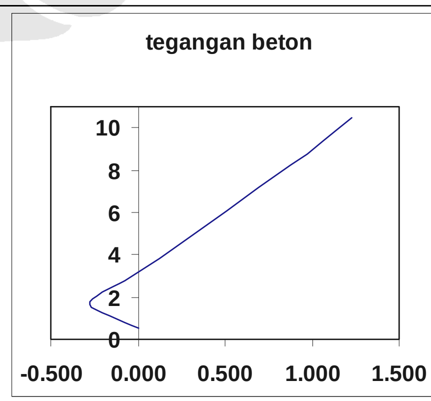
Lendutan = 0,0375 Inch



Gambar D.15.1. Gaya dalam balok PP3R2-3 pada retak awal



Grafik D.15.7. regangan beton balok PP3R2-3 pada retak awal

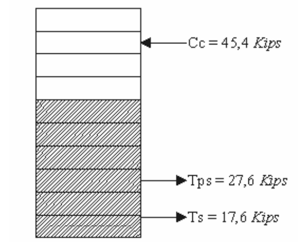


Grafik D.15.8. tegangan beton balok PP3R2-3 pada retak awal

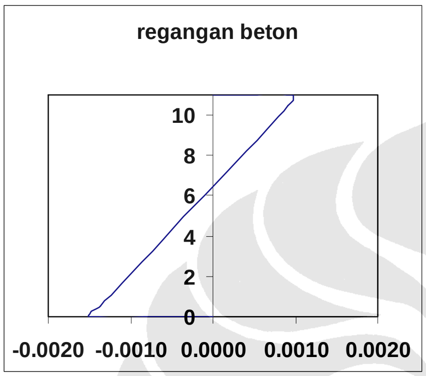
Leleh Pada Baja Prategang

P = 19,8 *Kips*

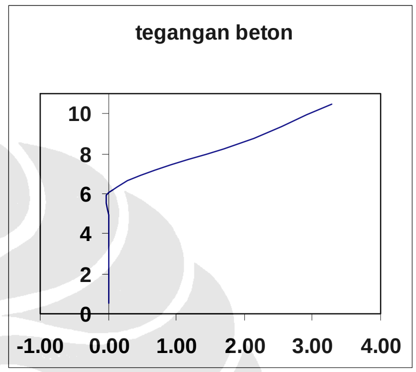
Lendutan = 0,225 Inch



Gambar D.15.2. Gaya dalam balok PP3R2-3 pada leleh baja prategang



Grafik D.15.9. regangan beton balok PP3R2-3 pada leleh baja prategang

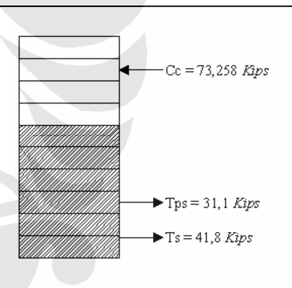


Grafik D.15.10. tegangan beton balok PP3R2-3 pada leleh baja prategang

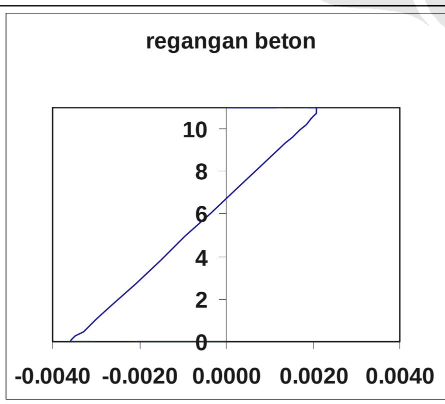
Leleh baja tulangan

P = 33,4 *Kips*

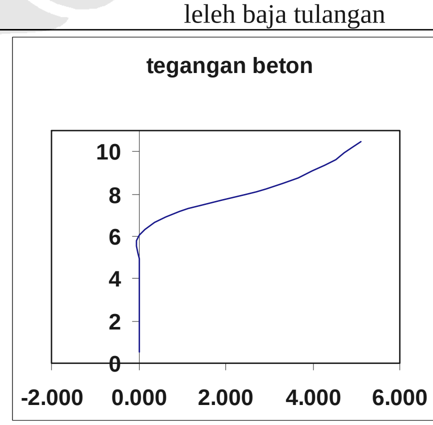
Lendutan = 0,525Inch



Gambar D.15.3. Gaya dalam balok PP3R3-0 pada leleh baja tulangan



Grafik D.15.11. regangan beton balok PP3R2-3 pada leleh baja tulangan

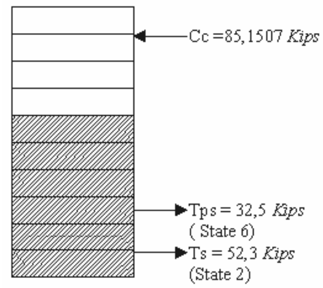


Grafik D.15.12. tegangan beton balok PP3R2-3 leleh baja tulangan

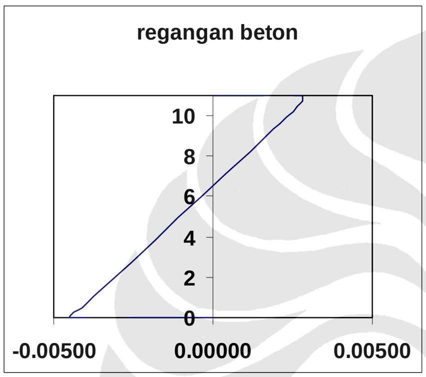
Ultimate

P = 38,1 *Kips*

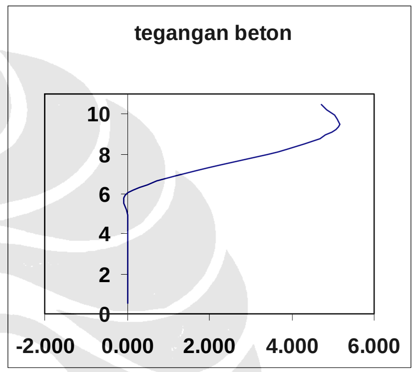
Lendutan = 0,675 Inch



Gambar D.15.4. Gaya dalam balok PP3R2-3 pada ultimate

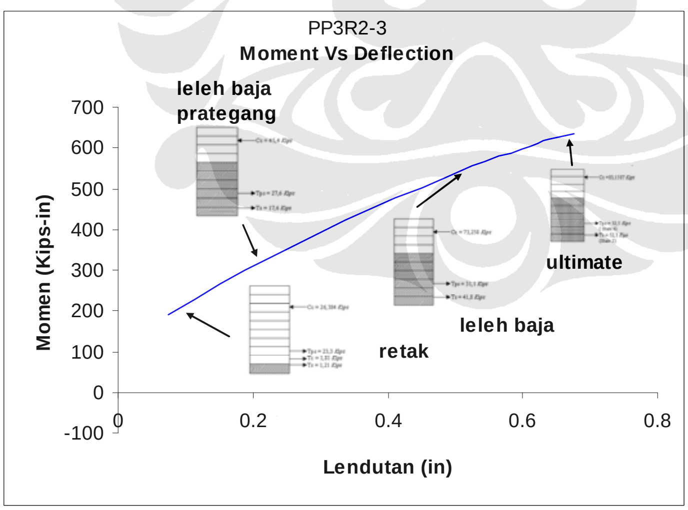


Grafik D.15.13. regangan beton balok PP3R2-3 pada ultimate



Grafik D.15.14. tegangan beton balok PP3R2-3 ultimate

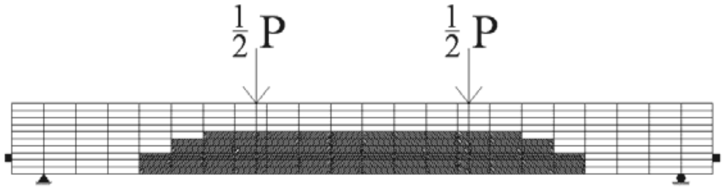
Tahapan Kerusakan Struktur



Grafik D.15.15. Momen vs lendutan tahapan kerusakan struktur beban balok PP3R2-3

Terlihat pada saat kegagalan baja tulangan dan baja prategang sedang mengalami kelelehan dan kegagalan yang terjadi akibat crushing pada beton

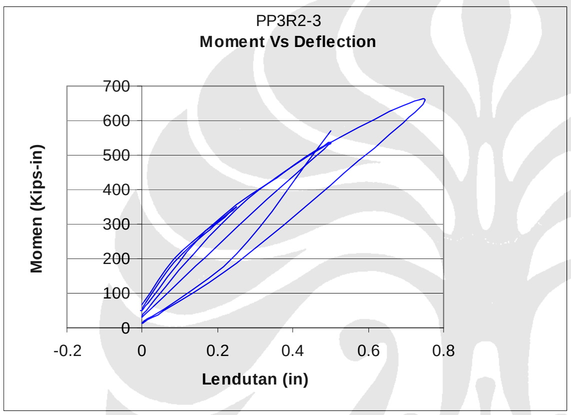
Retak pada beton pada saat ultimate



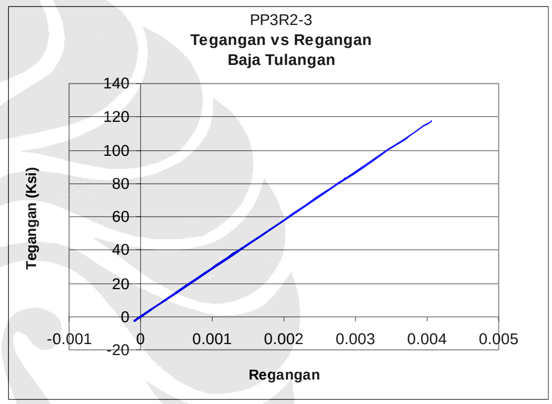
Gambar D.15.5. pola retak saat ultimate pada balok PP3R2-3

terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

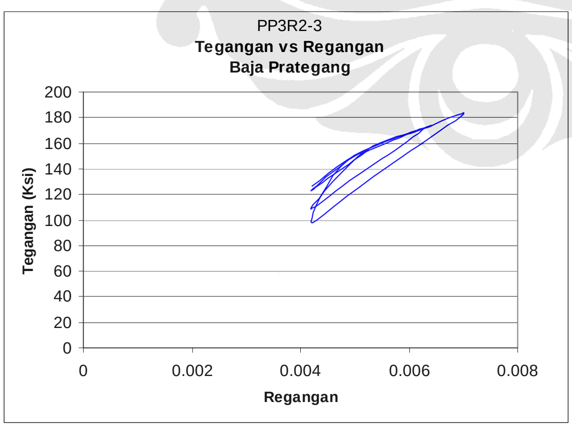


Grafik D.15.16. Momen vs lendutan beban semi siklik balok PP3R2-3



Grafik D.15.17. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP3R2-3

Tegangan vs Regangan Baja Prategang

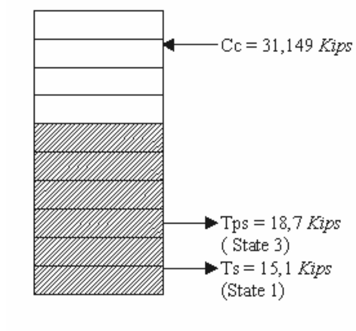


Grafik D.15.18. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP3R2-3

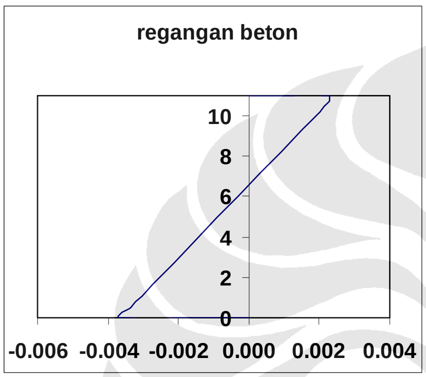
Kondisi Ultimate

P = 34,2 *Kips*

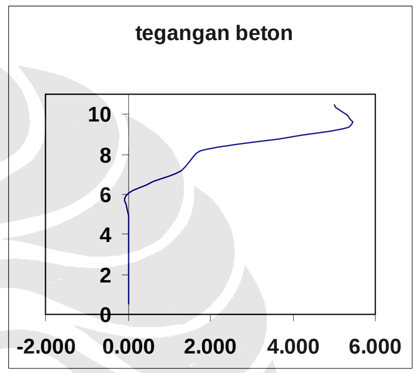
Lendutan = 0,5 *Inch*



Gambar D.15.6. Gaya dalam balok PP3R3-0 pada beban semi siklik



Grafik D.15.19. regangan beton beban semi siklik balok PP3R2-3

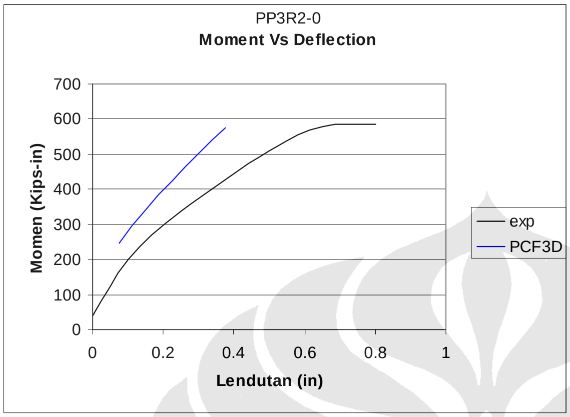


Grafik D.15.20. tegangan beton beban semi siklik balok PP3R2-3

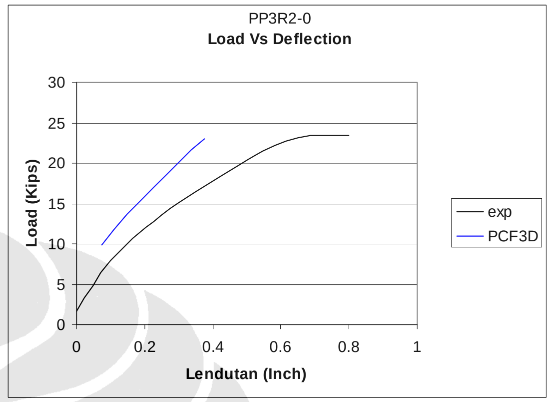
BALOK PP3R2-0

Beban Monotomik

OUPUT



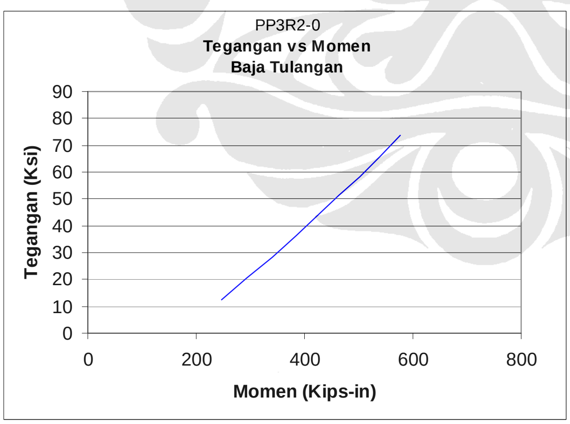
Grafik D.16.1. Momen vs lendutan control beban balok PP3R2-0



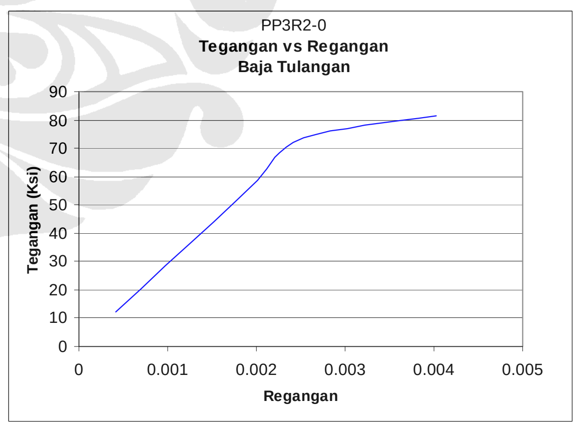
Grafik D.16.2. Beban vs lendutan control beban balok PP3R2-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



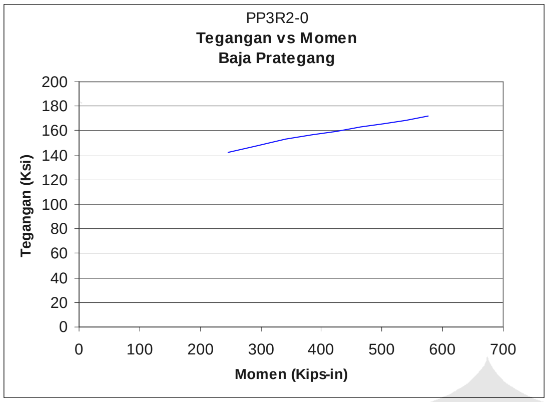
Grafik D.16.3. Tegangan baja tulangan vs momen control beban balok PP3R2-0



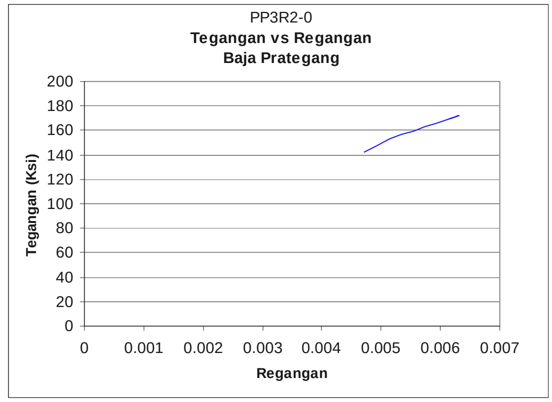
Grafik D.16.4. Tegangan vs regangan baja tulangan control beban balok PP3R2-0

Tegangan baja yang terjadi menjadi meningkat seiring dengan momen, terlihat bahwa baja tulangan sudah dalam keadaan plastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.16.5. Tegangan baja prategang vs momen control beban balok PP3R2-0



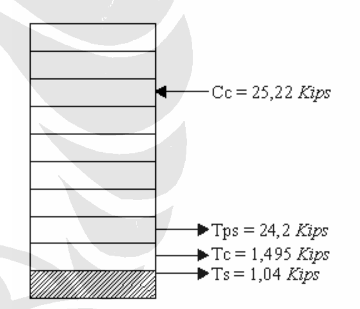
Grafik D.16.6. Tegangan vs regangan baja pratengang control beban balok PP3R2-0

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak , terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

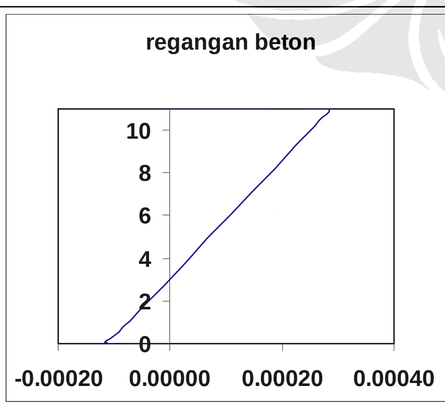
Retak awal Pada beton

P = 7,02 *Kips*

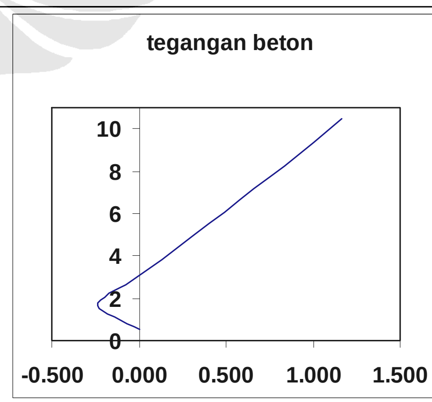
Lendutan = 0,03 Inch



Gambar D.16.1. Gaya dalam balok PP3R2-0 pada retak awal



Grafik D.16.7. regangan beton balok PP3R2-0 pada retak awal

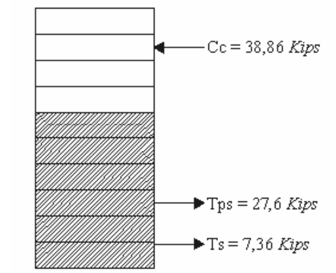


Grafik D.16.8. tegangan beton balok PP3R2-0 pada retak awal

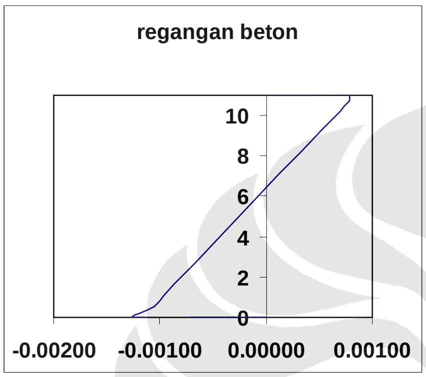
Leleh Pada Baja Prategang

P = 13,6 *Kips*

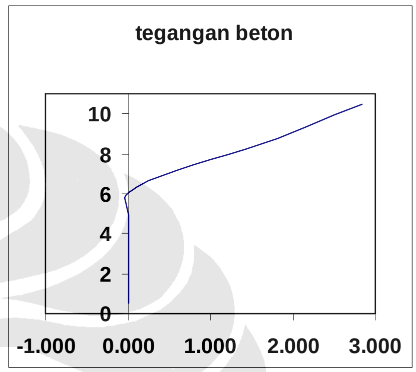
Lendutan = 0,15 Inch



Gambar D.16.2. Gaya dalam balok PP3R2-0 pada leleh baja prategang



Grafik D.16.9. regangan beton balok PP3R2-0 pada leleh baja prategang

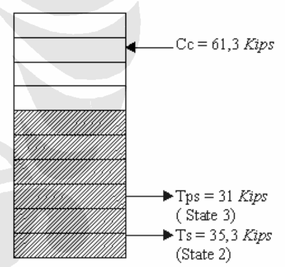


Grafik D.16.10. tegangan beton balok PP3R2-0 pada leleh baja prategang

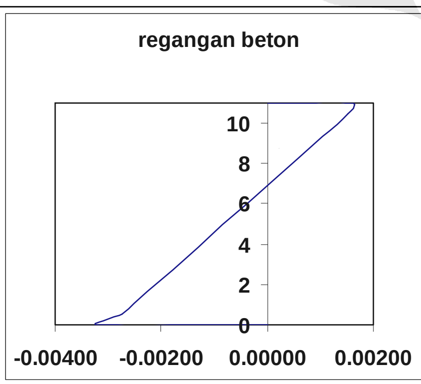
Leleh baja tulangan dan Ultimate

P = 23 *Kips*

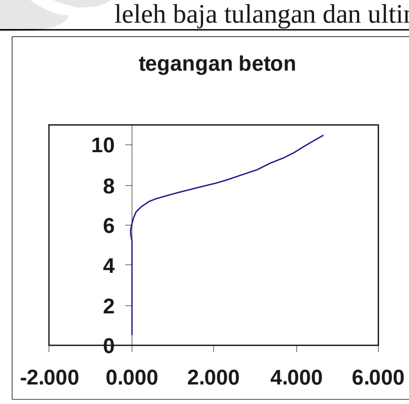
Lendutan = 0,375 Inch



Gambar D.16.3. Gaya dalam balok PP3R2-0 pada leleh baja tulangan dan ultimate

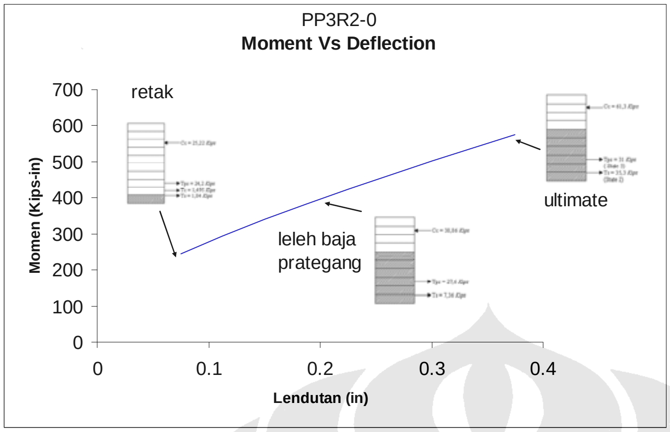


Grafik D.16.11. regangan beton balok PP3R2-0 pada leleh baja tulangan



Grafik D.16.12. tegangan beton balok PP3R2-0 leleh baja tulangan

Tahapan Kerusakan Struktur



Grafik D.16.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP3R2-0

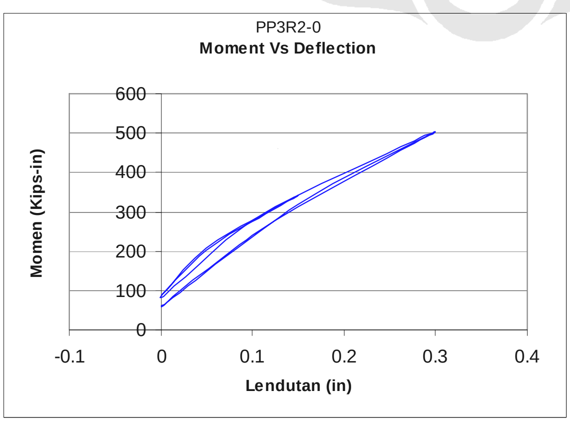
Terlihat pada saat kegagalan baja tulangan dan baja prategang sudah mengalami kelelehan dan kegagalan yang terjadi akibat crushing pada beton

Retak pada beton pada saat ultimate

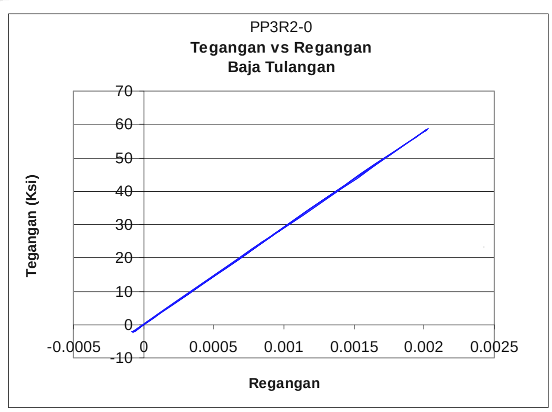
Gambar D.16.4. pola retak saat ultimate pada balok PP3R2-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

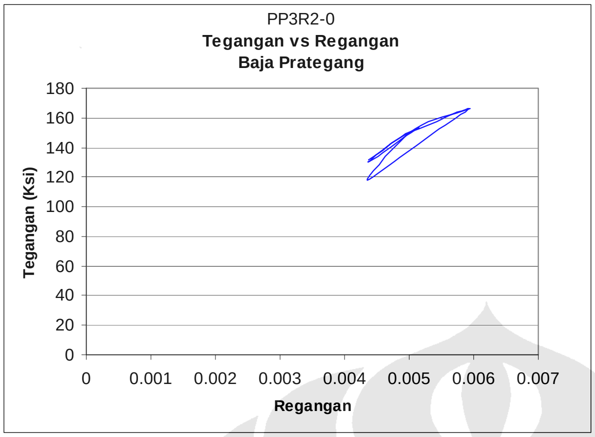


Grafik D.16.14. Momen vs lendutan beban semi siklik balok PP3R2-0



Grafik D.16.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP3R2-0

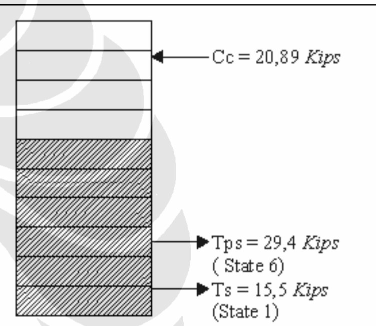
Tegangan vs Regangan Baja Prategang



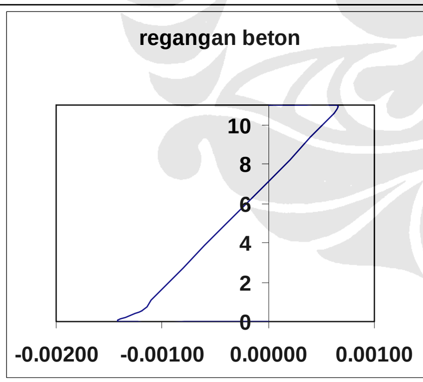
Grafik D.16.16. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP3R2-0

Kondisi Ultimate

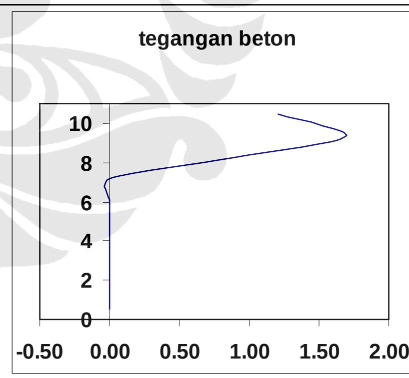
P	=	12	*Kips*
Lendutan	=	0,3	*Inch*



Gambar D.16.5. Gaya dalam balok PP3R3-0 pada beban semi siklik



Grafik D.16.17. regangan beton beban semi siklik balok PP3R2-0

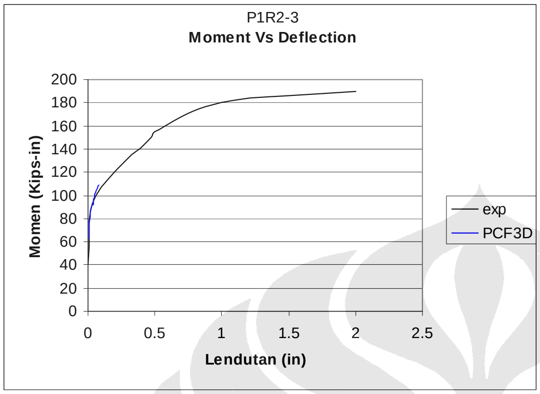


Grafik D.16.18. tegangan beton beban semi siklik balok PP3R2-0

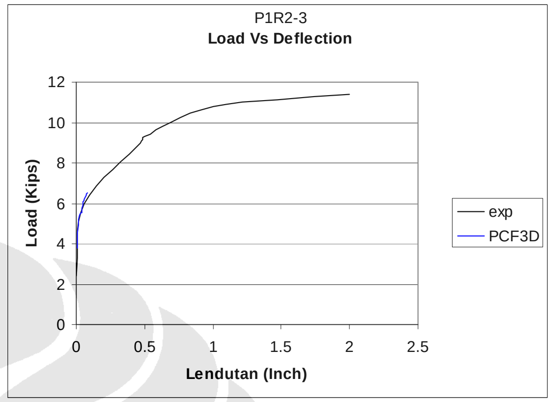
BALOK P1R2-3

Beban Monotomik

OUPUT



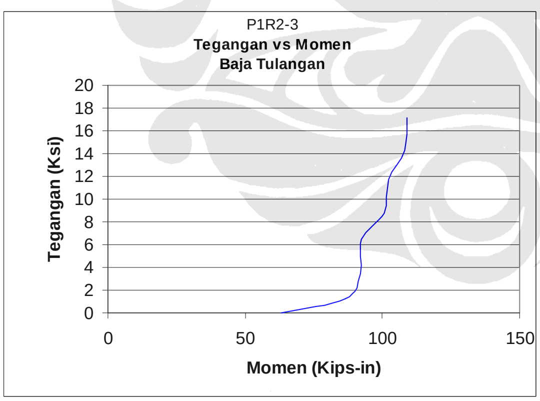
Grafik D.17.1. Momen vs lendutan control beban balok P1R2-3



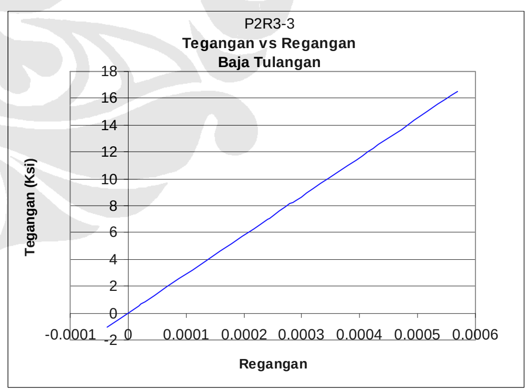
Grafik D.17.2. Beban vs lendutan control beban balok P1R2-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



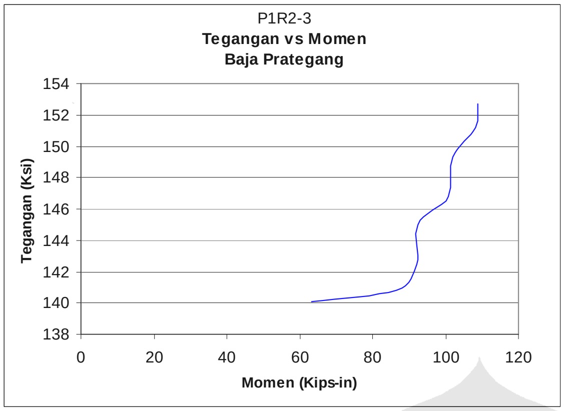
Grafik D.17.3. Tegangan baja tulangan vs momen control beban balok P1R2-3



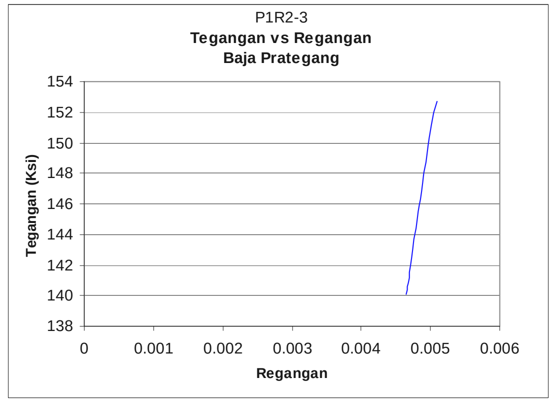
Grafik D.17.4. Tegangan vs regangan baja tulangan control beban balok P1R2-3

Tegangan baja yang terjadi menjadi tidak stabil pada saat beton mulai retak,terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.17.5. Tegangan baja prategang vs momen control beban balok P1R2-3



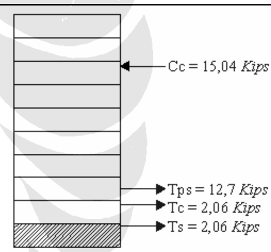
Grafik D.17.6. Tegangan vs regangan baja prategang control beban balok P1R2-3

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang masih dalam kondisi elastis pada saat kehancuran struktur.

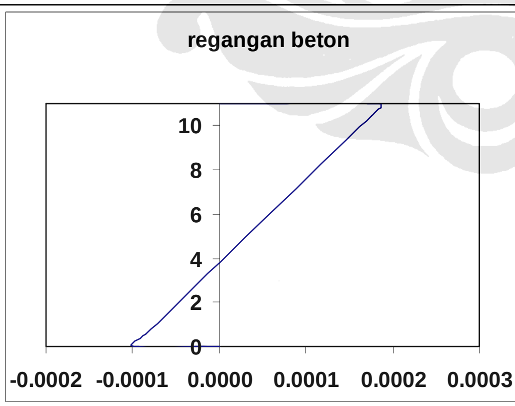
Retak awal Pada beton

P = 5,36 *Kips*

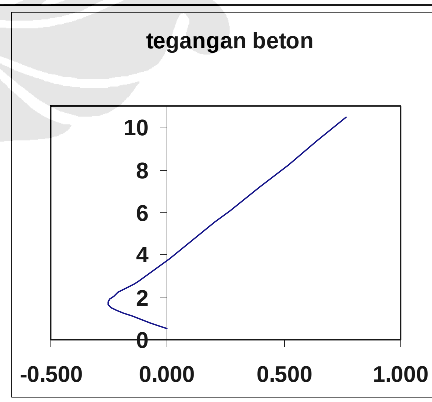
Lendutan = 0,024 Inch



Gambar D.17.1. Gaya dalam balok P1R2-3 pada retak awal



Grafik D.17.7. regangan beton balok P1R2-3 pada retak awal

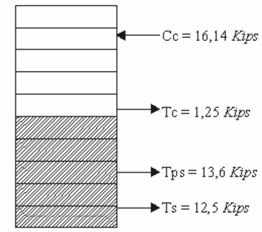


Grafik D.17.8. tegangan beton balok P1R2-3 pada retak awal

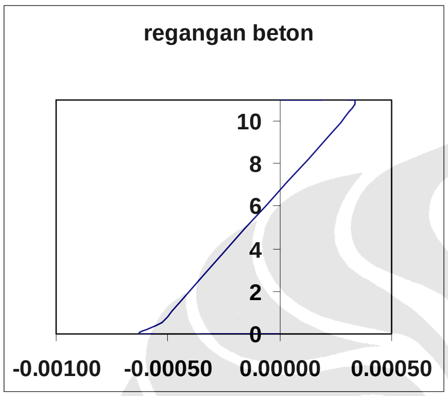
Leleh baja prategang

P = 6,49 *Kips*

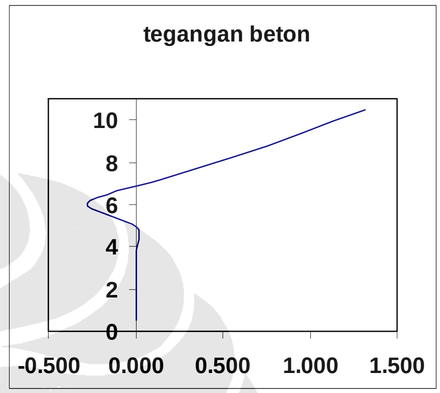
Lendutan = 0,07 Inch



Gambar D.17.2. Gaya dalam balok P1R2-3 pada leleh baja prategang



Grafik D.17.9. regangan beton balok P1R2-3 pada leleh baja prategang

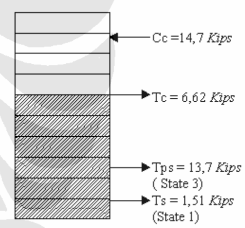


Grafik D.17.10. tegangan beton balok P1R2-3 leleh baja prategang

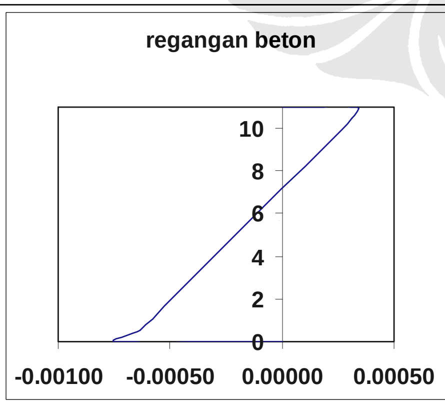
Ultimate

P = 6,53 *Kips*

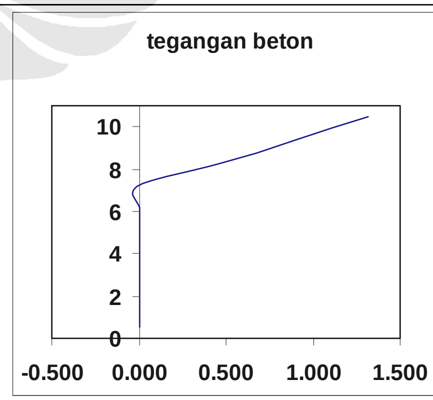
Lendutan = 0,08 Inch



Gambar D.17.3. Gaya dalam balok P1R2-3 pada ultimate

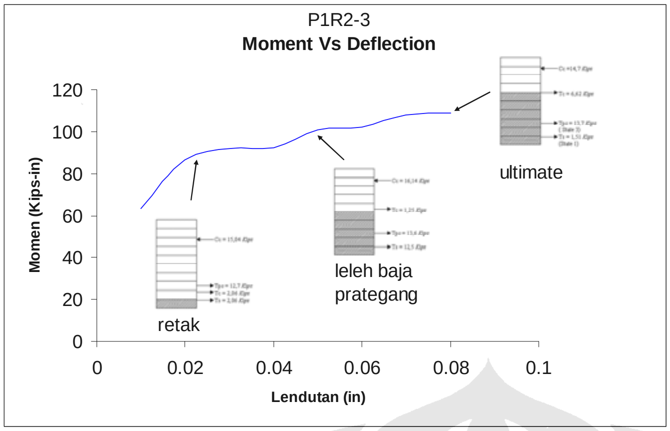


Grafik D.17.11. regangan beton balok P1R2-3 pada ultimate



Grafik D.17.12. tegangan beton balok P1R2-3 ultimate

Tahapan Kerusakan Struktur



Grafik D.17.13. Momen vs lendutan tahapan kerusakan struktur beban balok P1R2-3

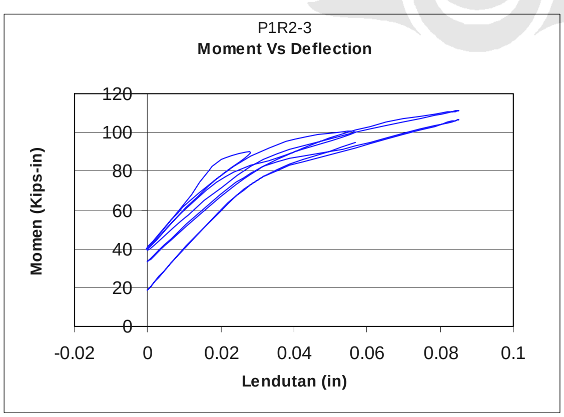
Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat Matriks kekakuan struktur yang menjadi tidak stabil.

Retak pada beton pada saat ultimate

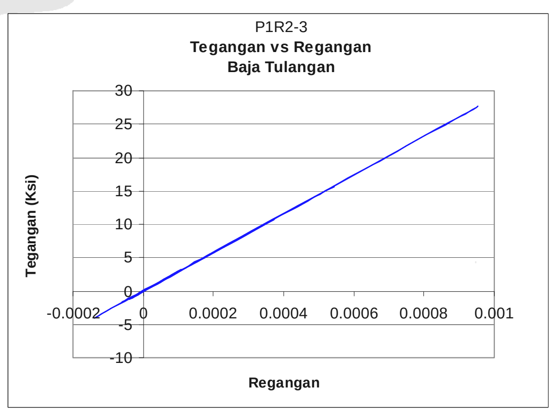
Gambar D.17.4. pola retak saat ultimate pada balok P1R2-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

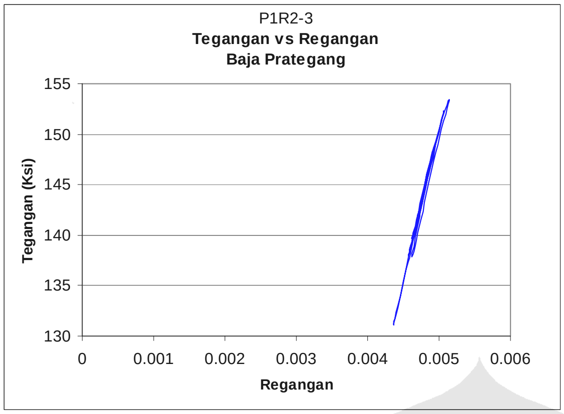
Beban Semi Siklik



Grafik D.17.14. Momen vs lendutan beban semi siklik balok P1R2-3



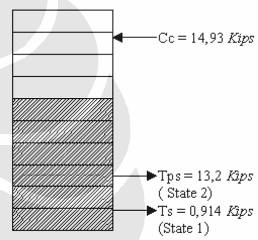
Grafik D.17.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P1R2-3



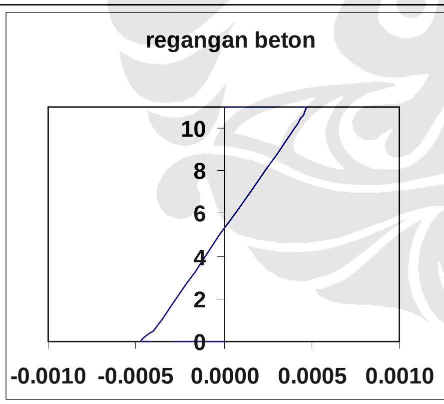
Grafik D.17.16. Tegangan vs regangan baja prategang akibat beban semi siklik balok P1R2-3

Kondisi Ultimate

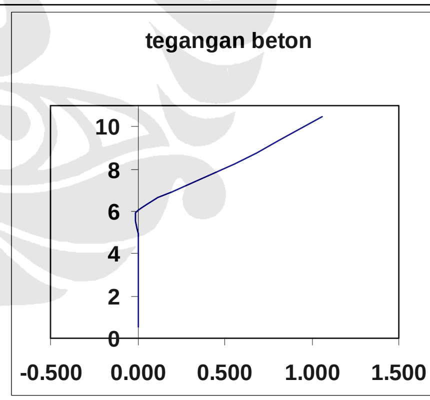
P	=	5,71 *Kips*
Lendutan	=	0,0567*Inch*



Gambar D.17.5. Gaya dalam balok P1R2-3 pada beban semi siklik



Grafik D.17.17. regangan beton beban semi siklik balok P1R2-3

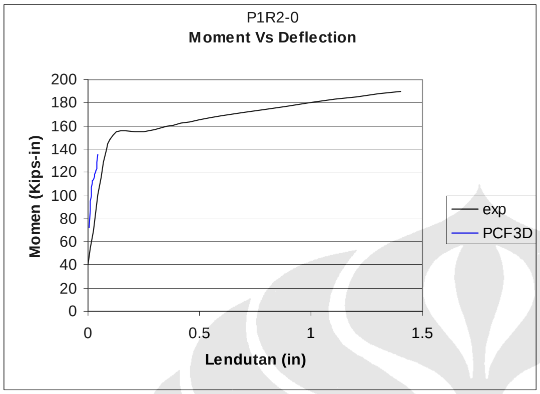


Grafik D.17.18. tegangan beton beban semi siklik balok P1R2-3

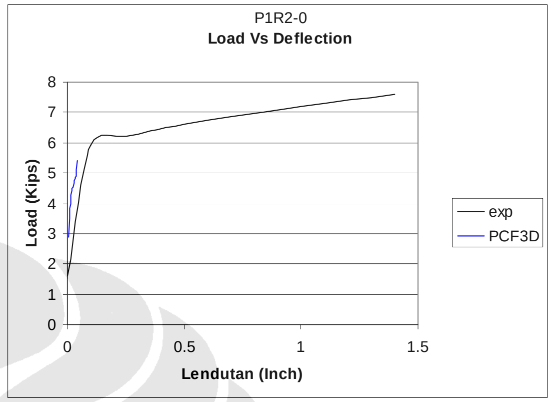
BALOK P1R2-0

Beban Monotomik

OUPUT



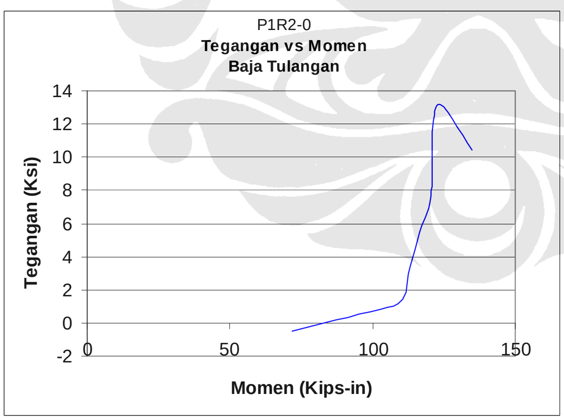
Grafik D.18.1. Momen vs lendutan control beban balok P1R2-0



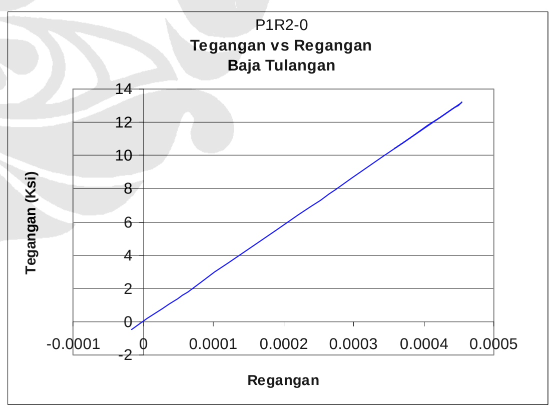
Grafik D.18.2. Beban vs lendutan control beban balok P1R2-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



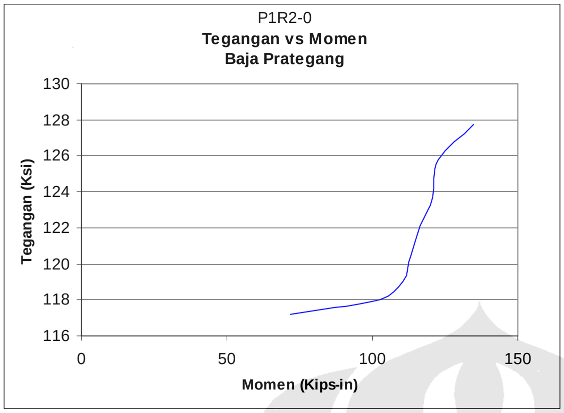
Grafik D.18.3. Tegangan baja tulangan vs momen control beban balok P1R2-0



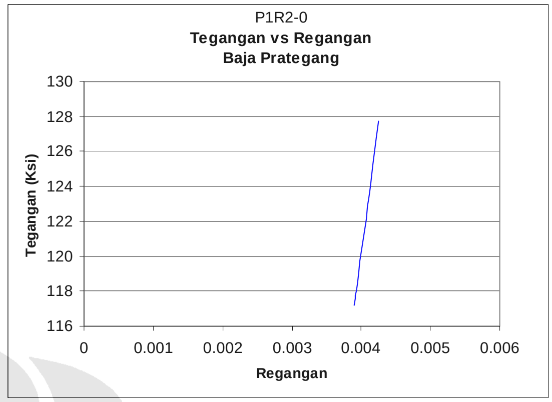
Grafik D.18.4. Tegangan vs regangan baja tulangan control beban balok P1R2-0

Tegangan baja yang terjadi meningkat seiring dengan meningkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.18.5. Tegangan baja prategang vs momen control beban balok P1R2-0



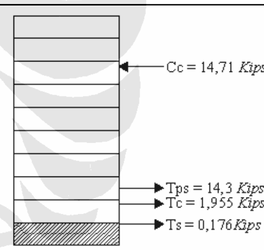
Grafik D.18.6. Tegangan vs regangan baja prategang control beban balok P1R2-0

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang masih dalam kondisi elastis pada saat kehancuran struktur.

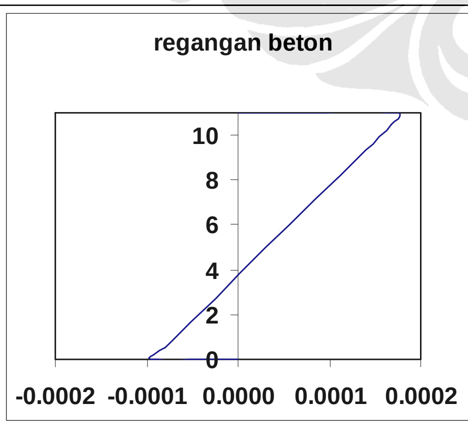
Retak awal Pada beton

P = 4,37 *Kips*

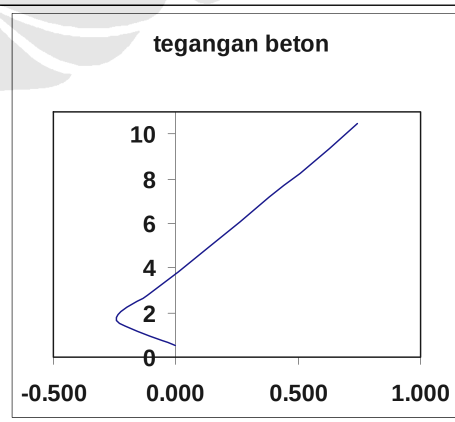
Lendutan = 0,0205 Inch



Gambar D.18.1. Gaya dalam balok P1R2-0 pada retak awal



Grafik D.18.7. regangan beton balok P1R2-0 pada retak awal

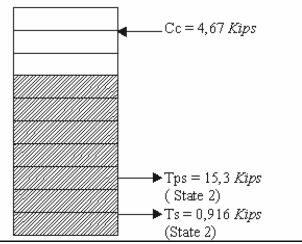


Grafik D.18.8. tegangan beton balok P1R2-0 pada retak awal

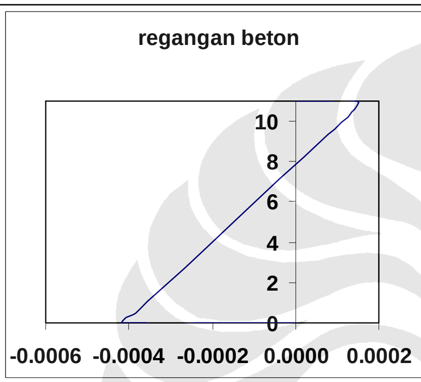
Ultimate

P = 5,4 *Kips*

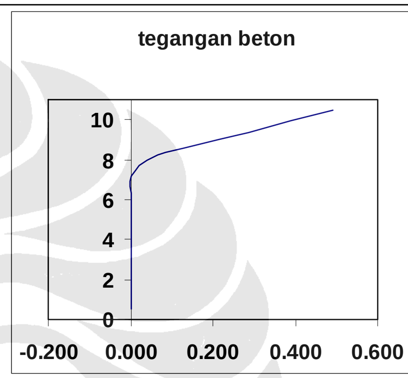
Lendutan = 0,0425 Inch



Gambar D.18.2. Gaya dalam balok P1R2-0 pada ultimate

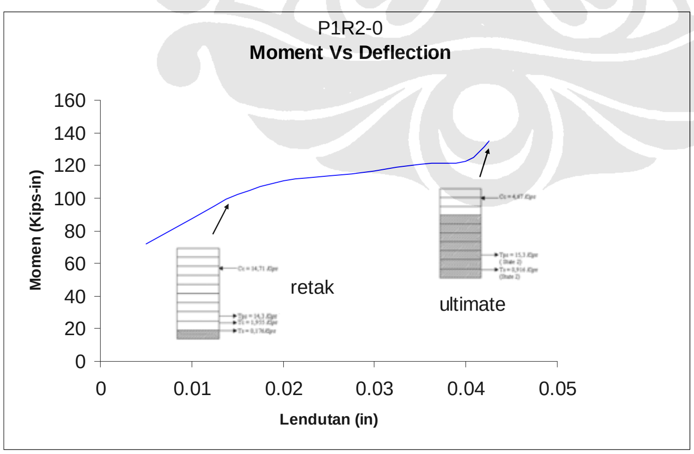


Grafik D.18.9. regangan beton balok P1R2-0 pada ultimate



Grafik D.18.10. tegangan beton balok P1R2-0 ultimate

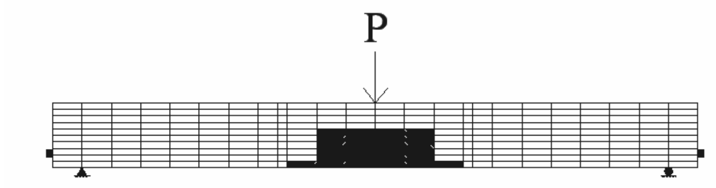
Tahapan Kerusakan Struktur



Grafik D.18.11. Momen vs lendutan tahapan kerusakan struktur beban balok P1R2-0

Terlihat pada saat kegagalan baja tulangan dan baja prategang belum mengalami kelelehan dan kegagalan yang terjadi akibat retak serat bawah akibat lentur pada beton

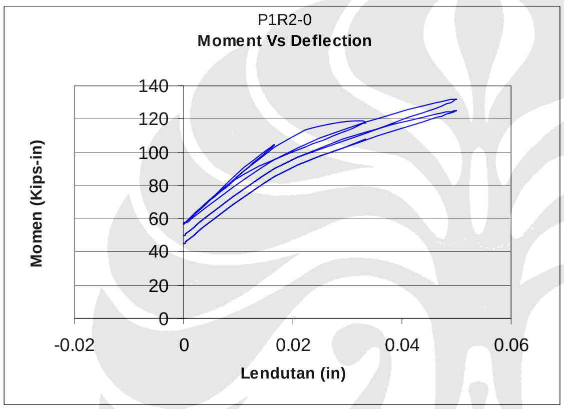
Retak pada beton pada saat ultimate



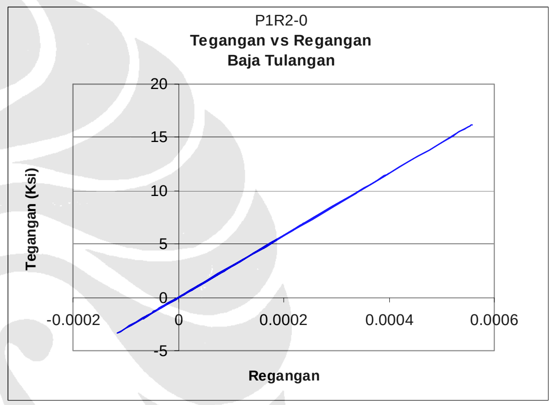
Gambar D.18.3. pola retak saat ultimate pada balok P1R2-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

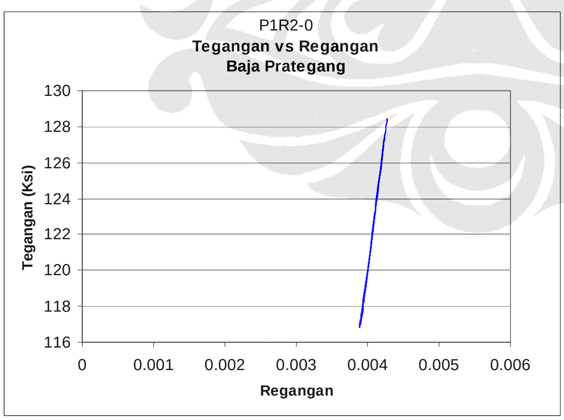
Beban Semi Siklik



Grafik D.18.12. Momen vs lendutan beban semi siklik balok P1R2-0



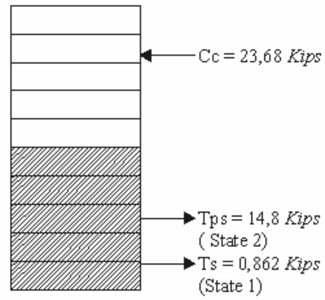
Grafik D.18.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P1R2-0



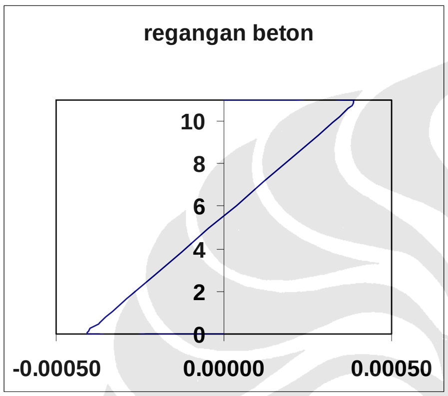
Grafik D.18.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P1R2-0

Kondisi Ultimate

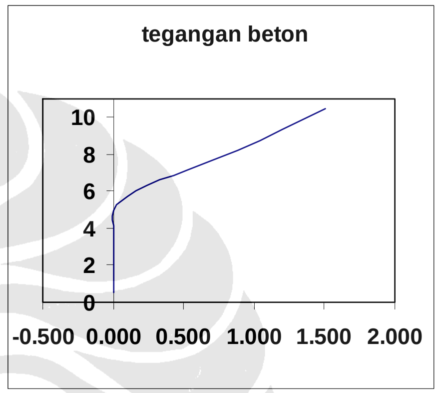
P	=	4,33	*Kips*
Lendutan	=	0,033	*Inch*



Gambar D.18.4. Gaya dalam balok P1R2-0 pada beban semi siklik



Grafik D.18.15. regangan beton beban semi siklik balok P1R2-0

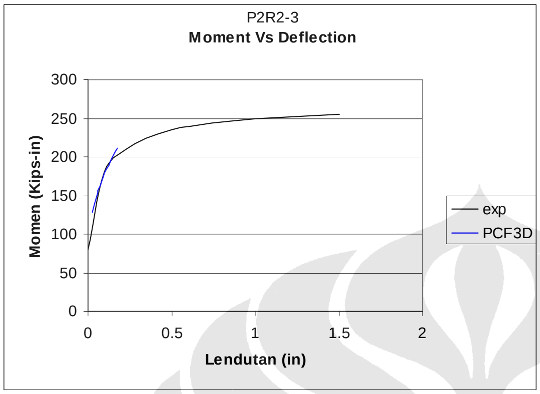


Grafik D.18.16. tegangan beton beban semi siklik balok P1R2-0

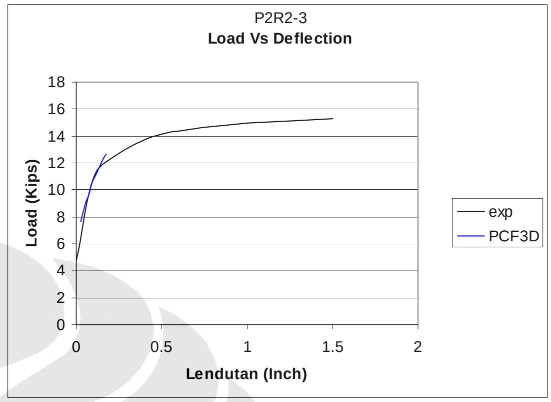
BALOK P2R2-3

Beban Monotomik

OUPUT



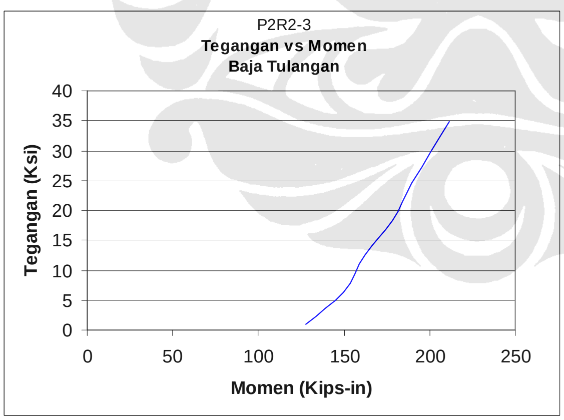
Grafik D.19.1. Momen vs lendutan control beban balok P2R2-3



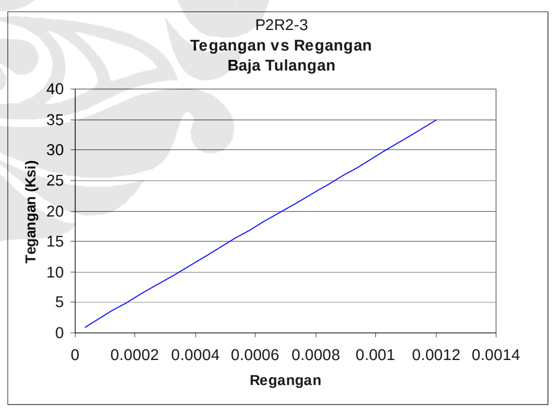
Grafik D.19.2. Beban vs lendutan control beban balok P2R2-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



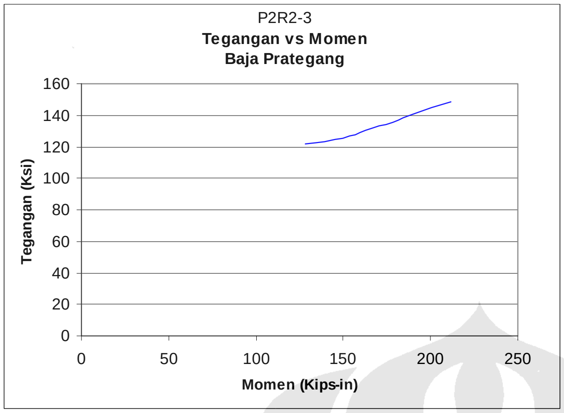
Grafik D.19.3. Tegangan baja tulangan vs momen control beban balok P2R2-3



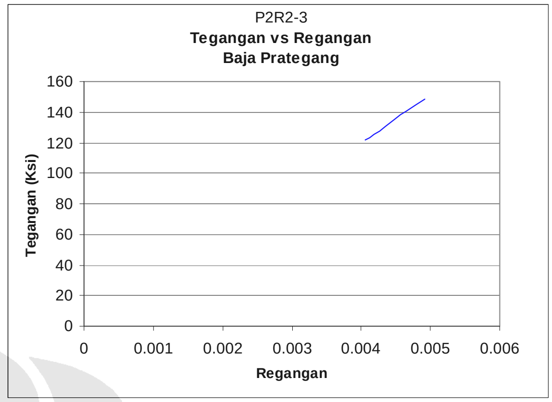
Grafik D.19.4. Tegangan vs regangan baja tulangan control beban balok P2R2-3

Tegangan baja yang terjadi meningkat seiring momen yang terjadi,terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.19.5. Tegangan baja prategang vs momen control beban balok P2R2-3



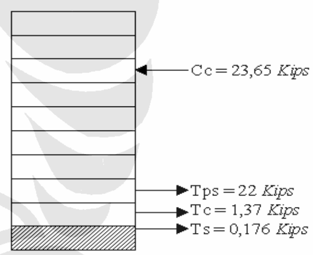
Grafik D.19.6. Tegangan vs regangan baja prategang control beban balok P2R2-3

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang masih dalam kondisi elastis pada saat kehancuran struktur.

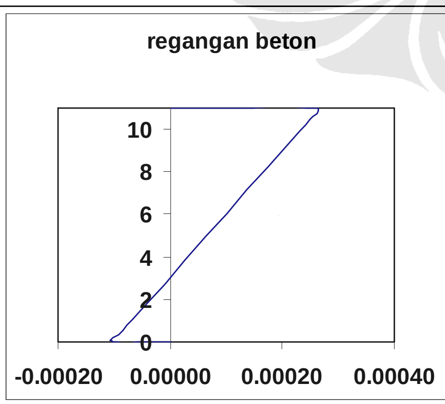
Retak awal Pada beton

P = 1,81 *Kips*

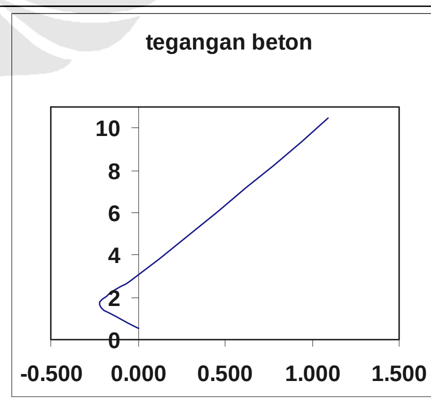
Lendutan = 0,035 Inch



Gambar D.19.1. Gaya dalam balok P2R2-3 pada retak awal



Grafik D.19.7. regangan beton balok P2R2-3 pada retak awal

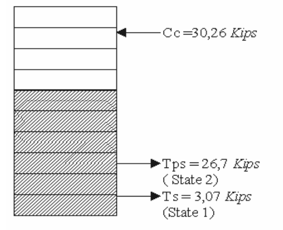


Grafik D.19.8. tegangan beton balok P2R2-3 pada retak awal

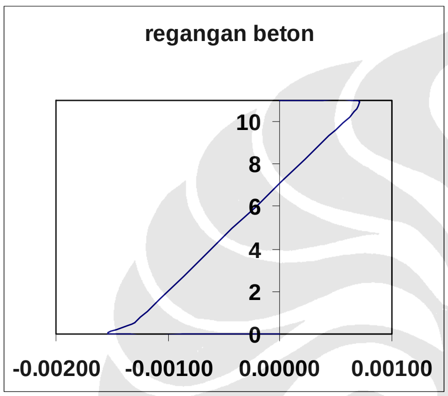
Ultimate

P = 12,7 *Kips*

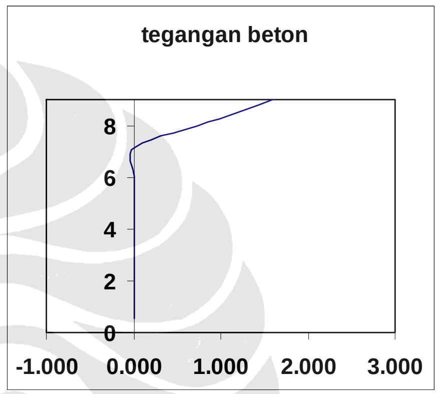
Lendutan = 0,175 Inch



Gambar D.19.2. Gaya dalam balok P2R2-3 pada ultimate

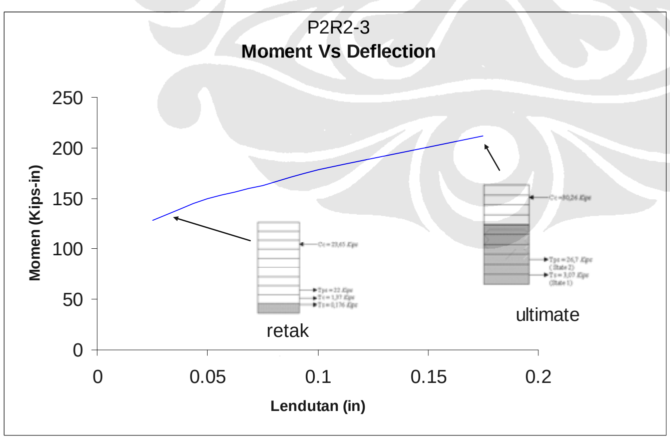


Grafik D.19.9. regangan beton balok P2R2-3 pada ultimate



Grafik D.19.10. tegangan beton balok P2R2-3 ultimate

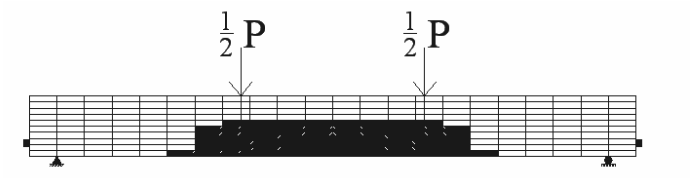
Tahapan Kerusakan Struktur



Grafik D.19.11. Momen vs lendutan tahapan kerusakan struktur beban balok P2R2-3

Terlihat pada saat kegagalan baja tulangan dan baja prategang masih dalam keadaan elastis dan kegagalan yang terjadi akibat crushing pada beton

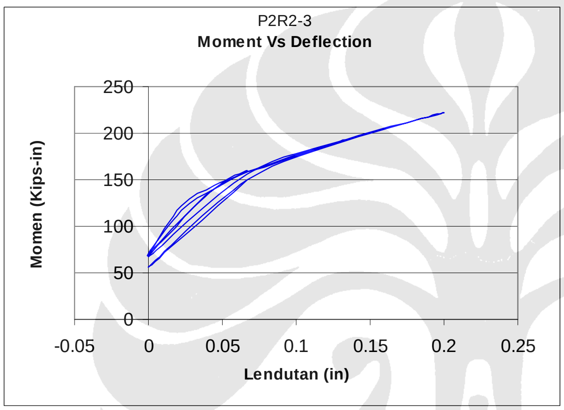
Retak pada beton pada saat ultimate



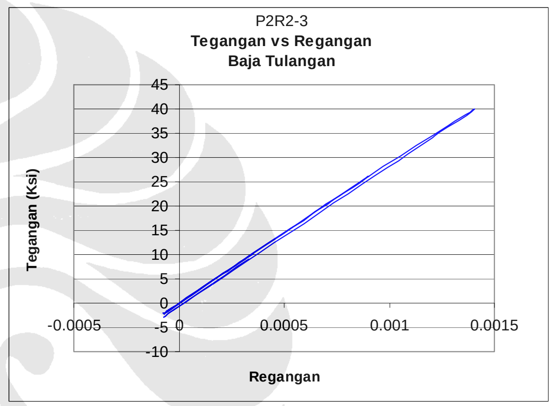
Gambar D.19.3. pola retak saat ultimate pada balok P2R2-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

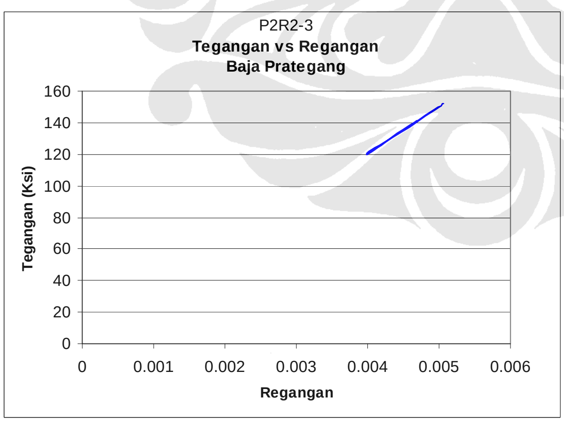
Beban Semi Siklik



Grafik D.19.12. Momen vs lendutan beban semi siklik balok P2R2-3



Grafik D.19.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P2R2-3

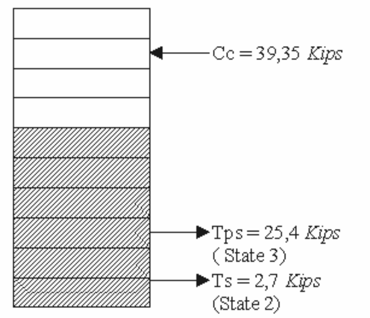


Grafik D.19.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P2R2-3

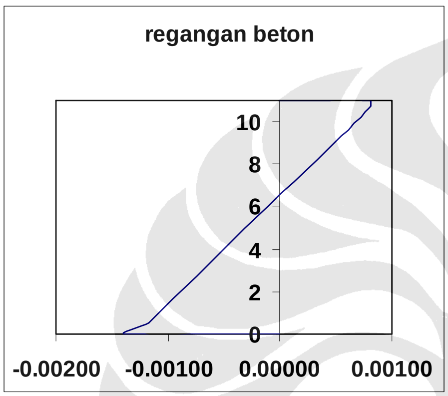
Kondisi Ultimate

P = 11,5 *Kips*

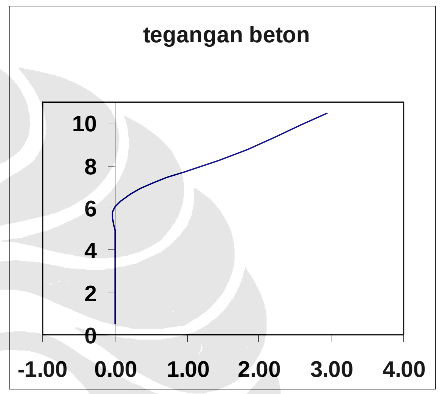
Lendutan = 0,133 *Inch*



Gambar D.19.4. Gaya dalam balok P2R2-3 pada beban semi siklik



Grafik D.19.15. regangan beton beban semi siklik balok P2R2-3

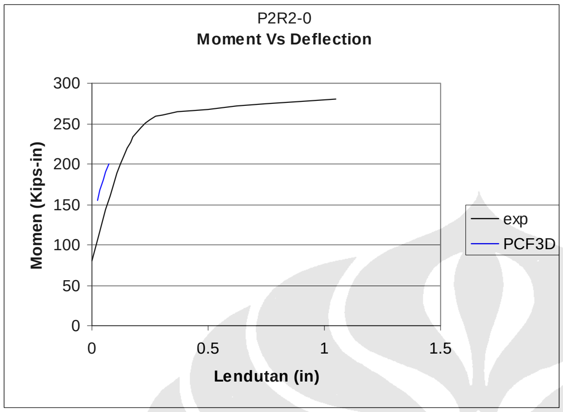


Grafik D.19.16. tegangan beton beban semi siklik balok P2R2-3

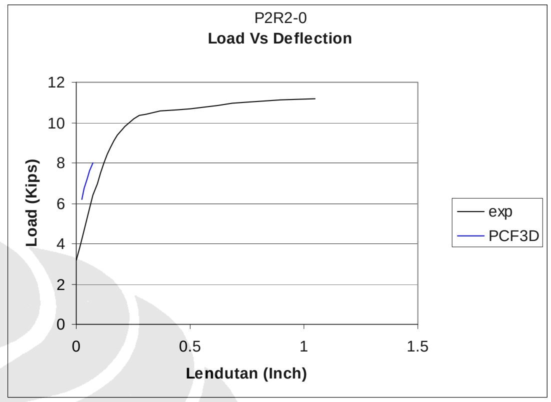
BALOK P2R2-0

Beban Monotomik

OUPUT



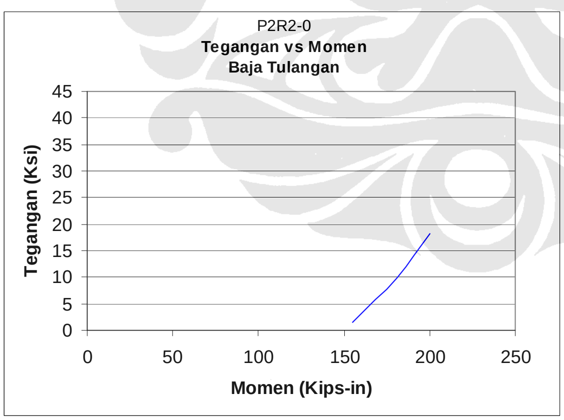
Grafik D.20.1. Momen vs lendutan control beban balok P2R2-0



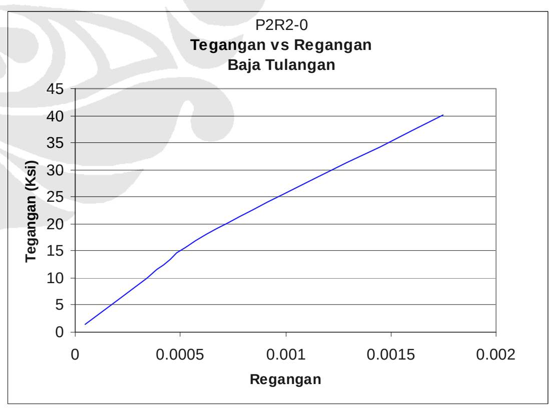
Grafik D.20.2. Beban vs lendutan control beban balok P2R2-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



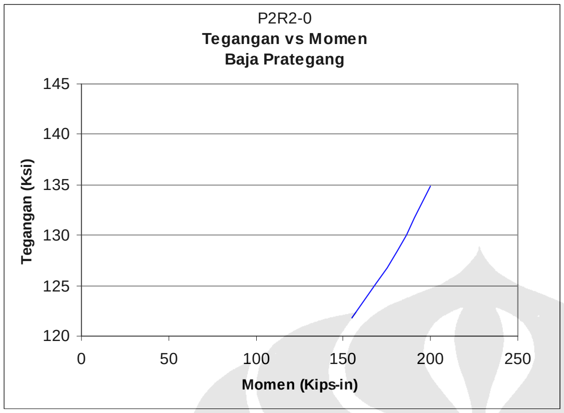
Grafik D.20.3. Tegangan baja tulangan vs momen control beban balok P2R2-0



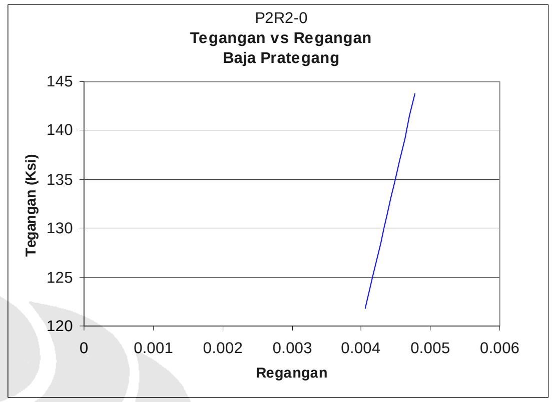
Grafik D.20.4. Tegangan vs regangan baja tulangan control beban balok P2R2-0

Tegangan baja yang terjadi meningkat seiring momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.20.5. Tegangan baja prategang vs momen control beban balok P2R2-0



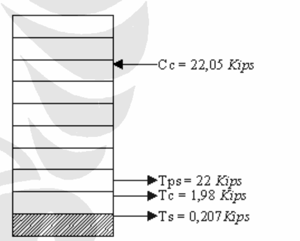
Grafik D.20.6. Tegangan vs regangan baja prategang control beban balok P2R2-0

Terlihat bahwa kenaikan tegangan baja prategang meningkat seiring dengan pertambahan momen yang terjadi, terlihat bahwa baja prategang masih dalam kondisi elastis pada saat kehancuran struktur.

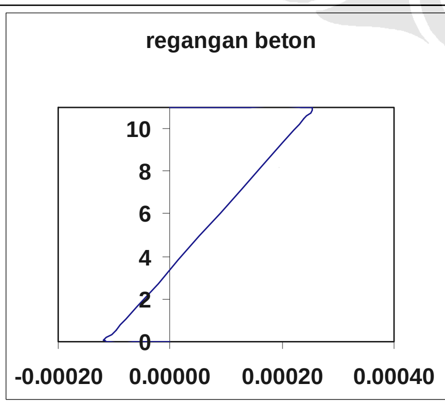
Retak awal Pada beton

P = 6,34 *Kips*

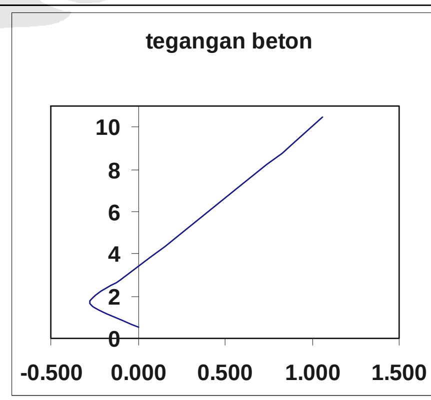
Lendutan = 0,0275 Inch



Gambar D.20.1. Gaya dalam balok P2R2-0 pada retak awal



Grafik D.20.7. regangan beton balok P2R2-0 pada retak awal

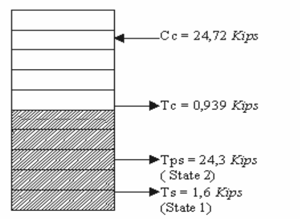


Grafik D.20.8. tegangan beton balok P2R2-0 pada retak awal

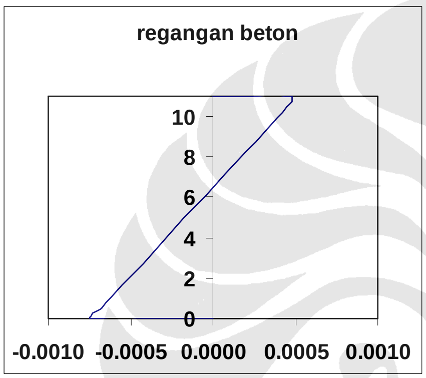
Ultimate

P = 8 *Kips*

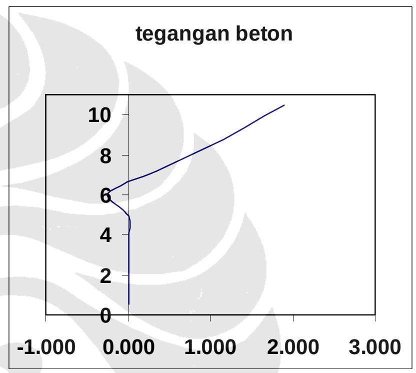
Lendutan = 0,1 Inch



Gambar D.20.2. Gaya dalam balok P2R2-0 pada ultimate

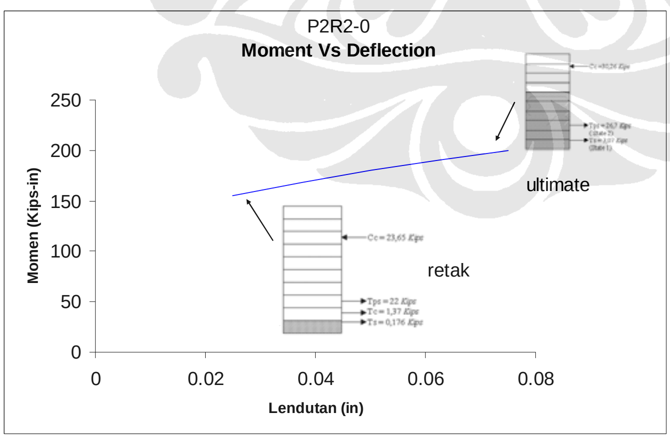


Grafik D.20.9. regangan beton balok P2R2-0 pada ultimate



Grafik D.20.10. tegangan beton balok P2R2-0 ultimate

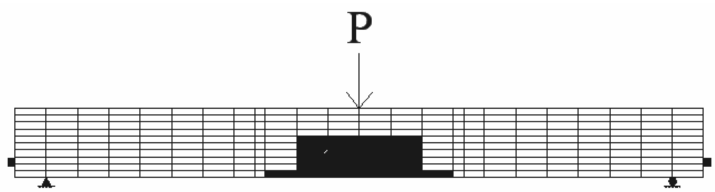
Tahapan Kerusakan Struktur



Grafik D.20.11. Momen vs lendutan tahapan kerusakan struktur beban balok P2R2-0

Terlihat pada saat kegagalan baja tulangan dan baja prategang baru belum mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil

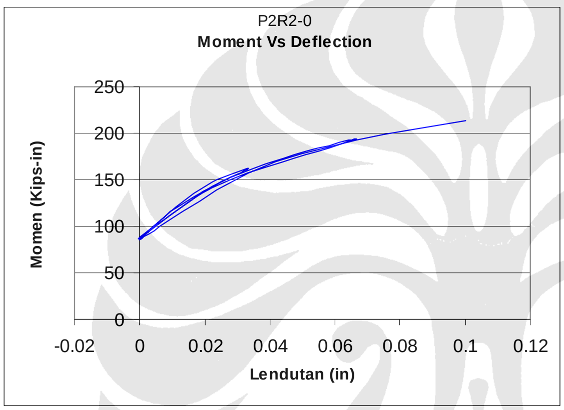
Retak pada beton pada saat ultimate



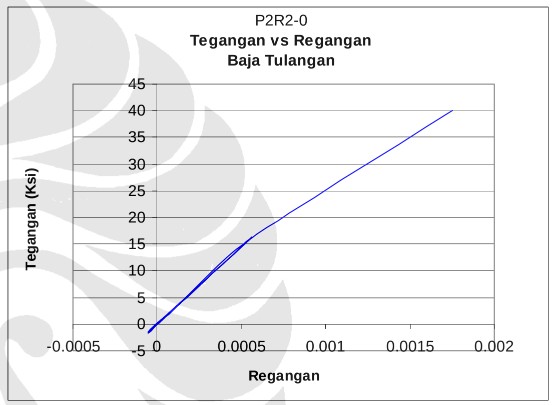
Gambar D.20.3. pola retak saat ultimate pada balok P2R2-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

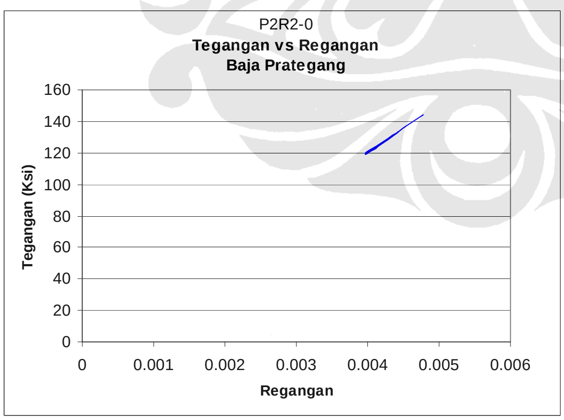
Beban Semi Siklik



Grafik D.20.12. Momen vs lendutan beban semi siklik balok P2R2-0



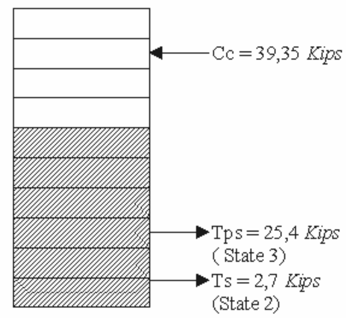
Grafik D.20.13. Tegangan vs regangan baja tulangan akibat beban semi siklik balok P2R2-0



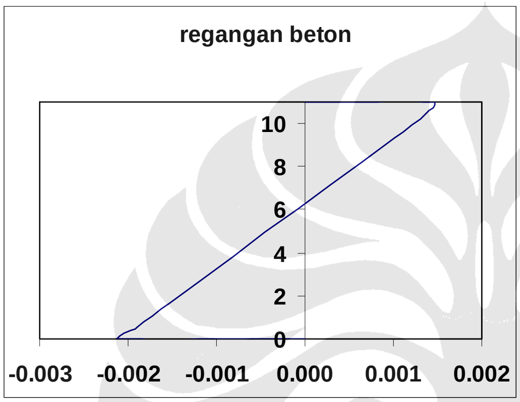
Grafik D.20.14. Tegangan vs regangan baja prategang akibat beban semi siklik balok P2R2-0

Kondisi Ultimate

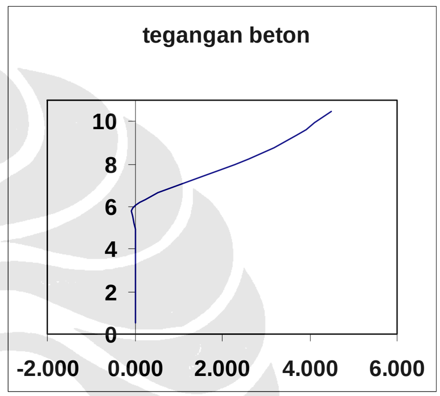
P	=	8,55	*Kips*
Lendutan	=	0,1	*Inch*



Gambar D.20.4. Gaya dalam balok P2R2-0 pada beban semi siklik



Grafik D.20.15. regangan beton beban semi siklik balok P2R2-0

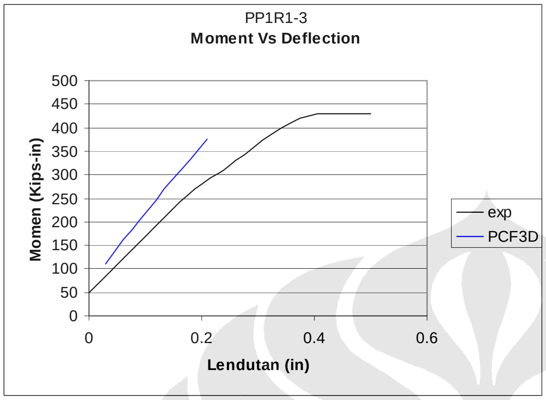


Grafik D.20.16. tegangan beton beban semi siklik balok P2R2-0

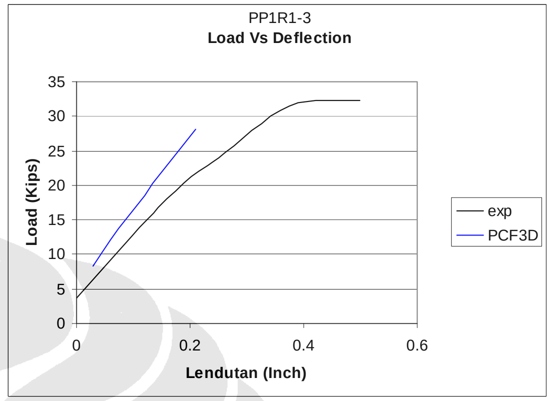
BALOK PP1R1-3

Beban Monotomik

OUPUT



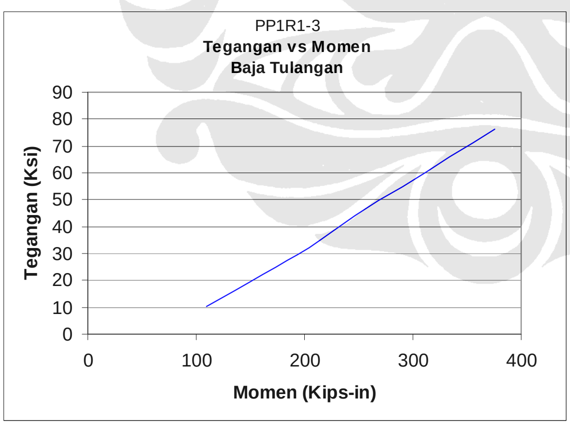
Grafik D.21.1. Momen vs lendutan control beban balok PP1R1-3



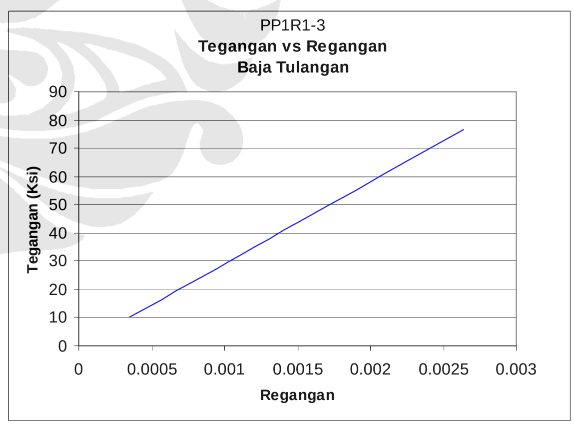
Grafik D.21.2. Beban vs lendutan control beban balok PP1R1-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



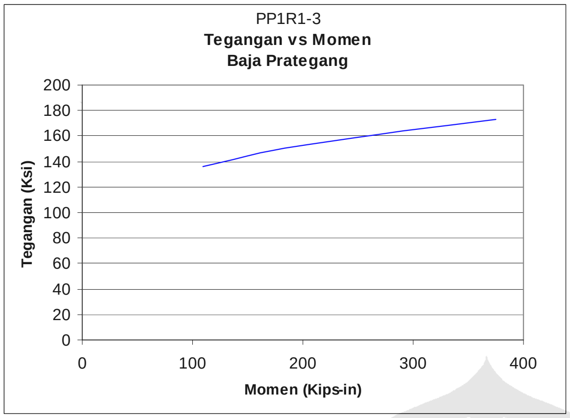
Grafik D.21.3. Tegangan baja tulangan vs momen control beban balok PP1R1-3



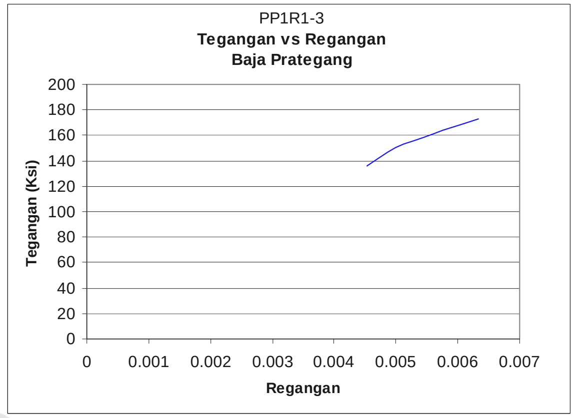
Grafik D.21.4. Tegangan vs regangan baja tulangan control beban balok PP1R1-3

Tegangan baja yang terjadi meningkat seiring dengan menigkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.21.5. Tegangan baja prategang vs momen control beban balok PP1R1-3



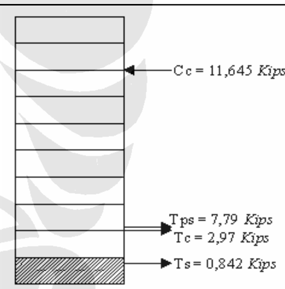
Grafik D.21.6. Tegangan vs regangan baja pratengang control beban balok PP1R1-3

Tegangan baja yang terjadi meningkat seiring dengan menigkatnya momen yang terjadi, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

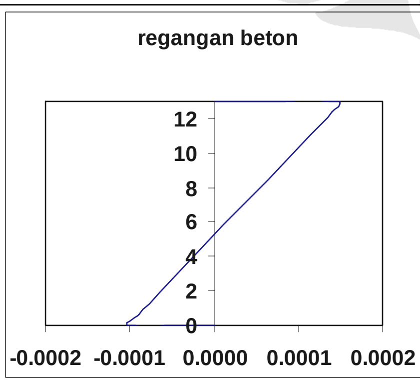
Retak awal Pada beton

P = 6,79*Kips*

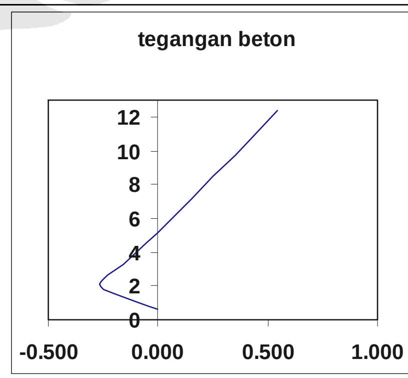
Lendutan = 0,012 Inch



Gambar D.21.1. Gaya dalam balok PP1R1-3 pada retak awal



Grafik D.21.7. regangan beton balok PP1R1-3 pada retak awal

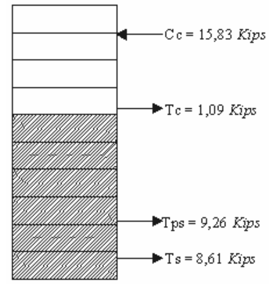


Grafik D.21.8. tegangan beton balok PP1R1-3 pada retak awal

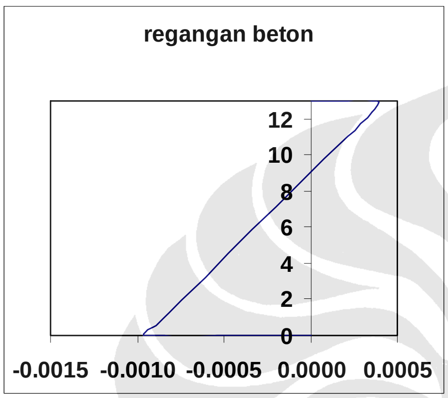
Leleh Pada Baja Prategang

P = 10,3 *Kips*

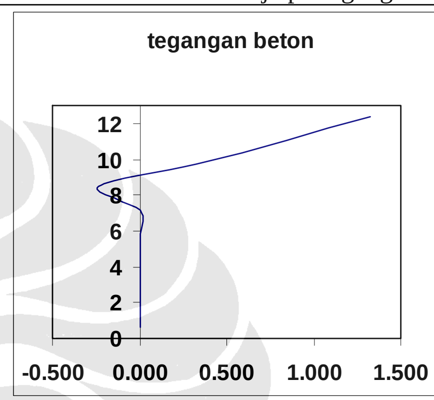
Lendutan = 0,06 Inch



Gambar D.21.2. Gaya dalam balok PP1R1-3 pada leleh baja prategang



Grafik D.21.9. regangan beton balok PP1R1-3 pada leleh baja prategang

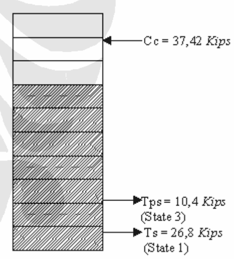


Grafik D.21.10. tegangan beton balok PP2R1-3 pada leleh baja prategang

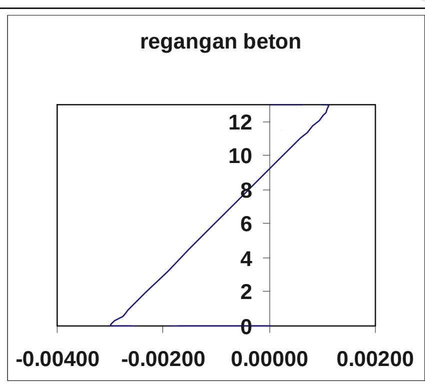
Ultimate

P = 28,1 *Kips*

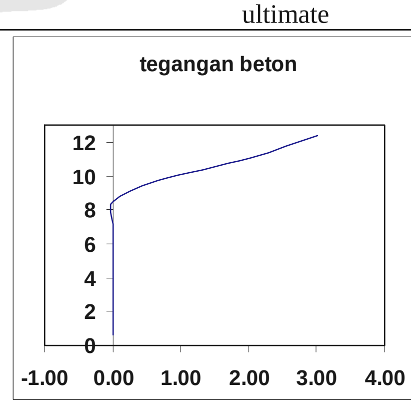
Lendutan = 0,21 Inch



Gambar D.21.3. Gaya dalam balok PP1R1-3 pada ultimate

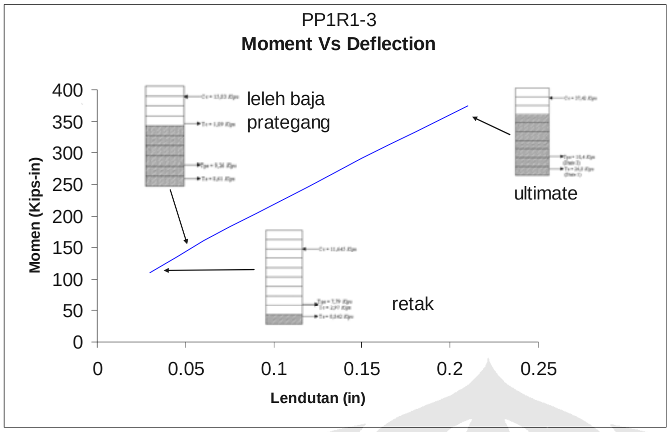


Grafik D.21.11. regangan beton balok PP1R1-3 pada ultimate



Grafik D.21.12. tegangan beton balok PP1R1-3 ultimate

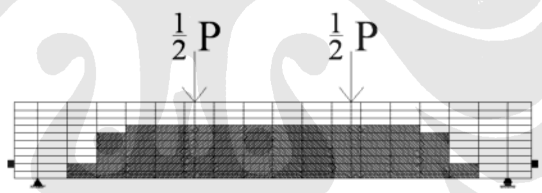
Tahapan Kerusakan Struktur



Grafik D.21.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP1R1-3

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang sudah mengalami kelelehan dan kegagalan yang terjadi akibat crushing pada beton.

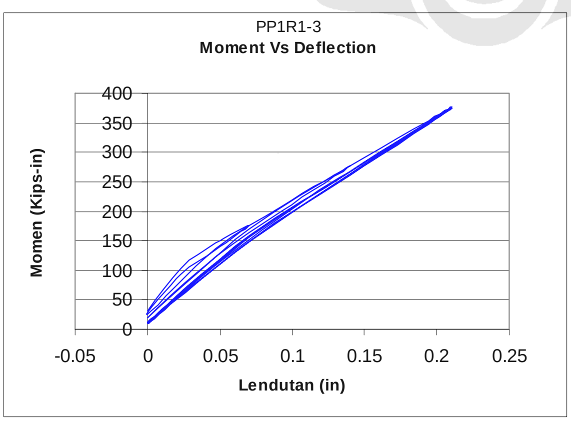
Retak pada beton pada saat ultimate



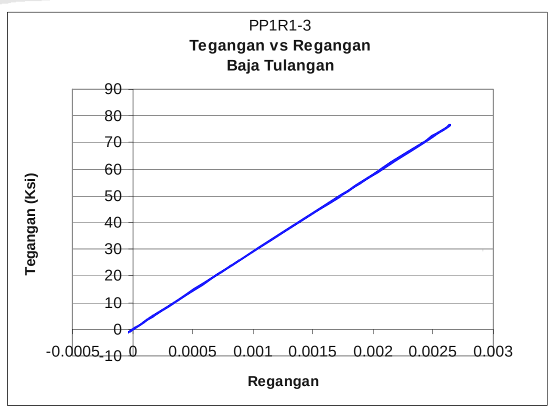
Gambar D.21.4. pola retak saat ultimate pada balok PP1R1-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

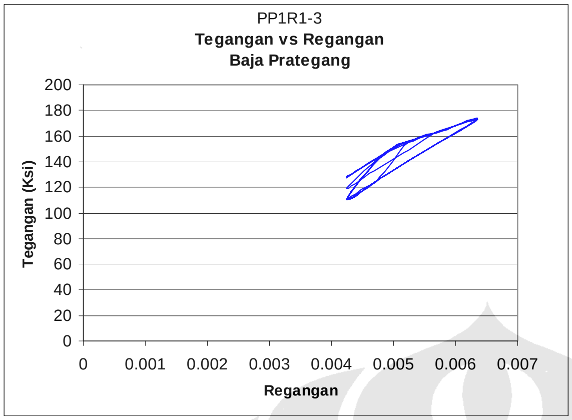


Grafik D.21.14. Momen vs lendutan beban semi siklik balok PP1R1-3



Grafik D.21.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP1R1-3

Tegangan vs Regangan Baja Prategang

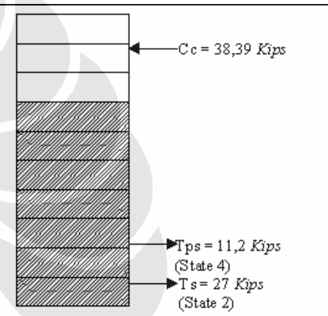


Grafik D.21.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP1R1-3

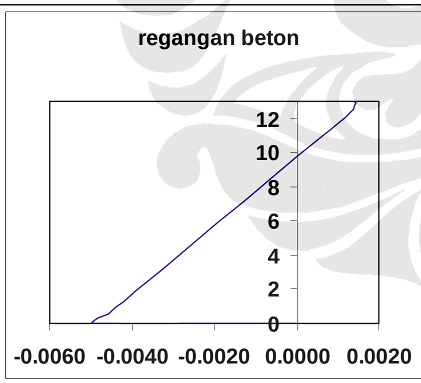
Kondisi Ultimate

P = 29,5 *Kips*

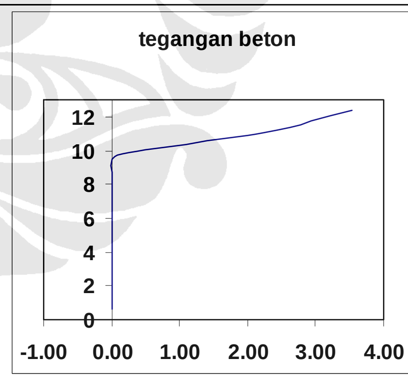
Lendutan = 0,284 *Inch*



Gambar D.21.5. Gaya dalam balok PP1R1-3 pada beban semi siklik



Grafik D.21.17. regangan beton beban semi siklik balok PP1R1-3

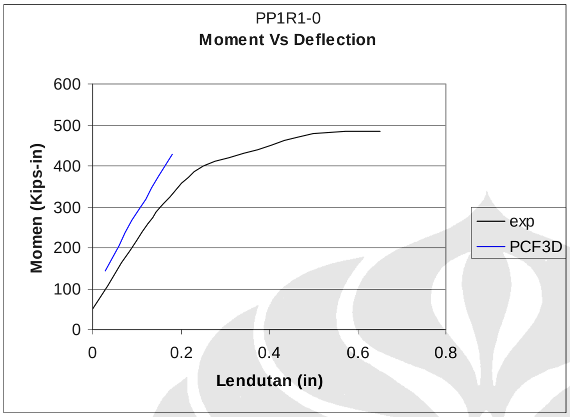


Grafik D.21.18. tegangan beton beban semi siklik balok PP1R1-3

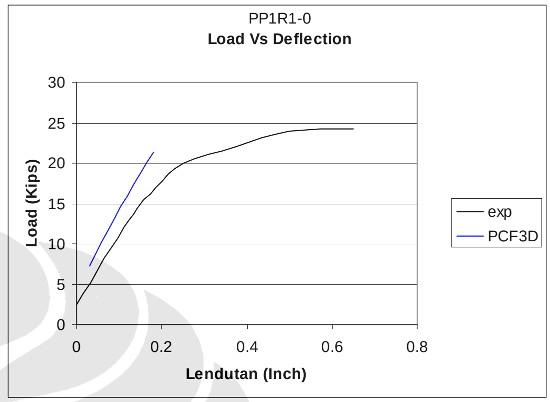
BALOK PP1R1-0

Beban Monotomik

OUPUT



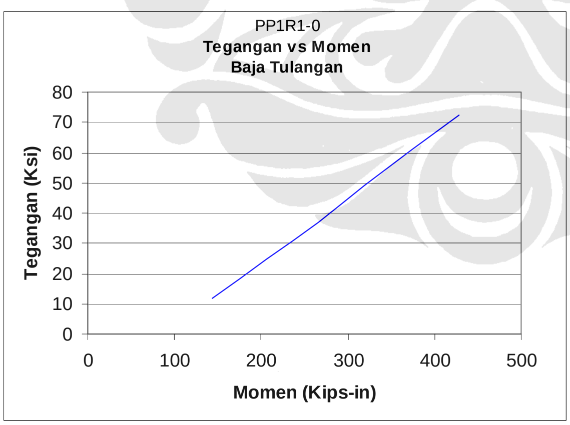
Grafik D.22.1. Momen vs lendutan control beban balok PP1R1-0



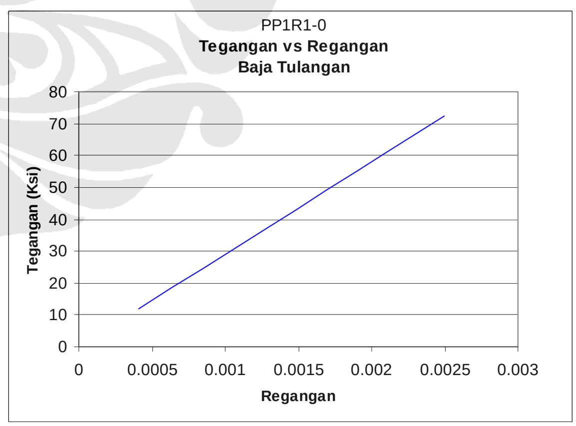
Grafik D.22.2. Beban vs lendutan control beban balok PP1R1-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



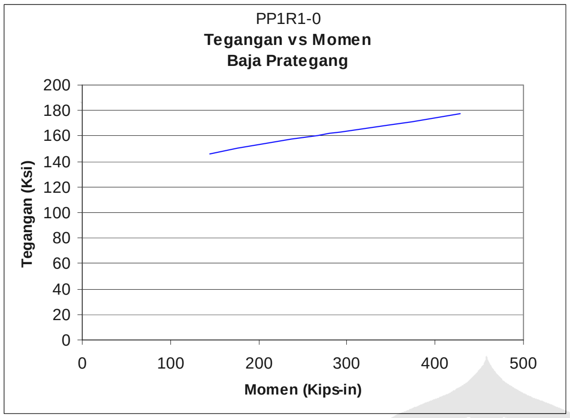
Grafik D.22.3. Tegangan baja tulangan vs momen control beban balok PP1R1-0



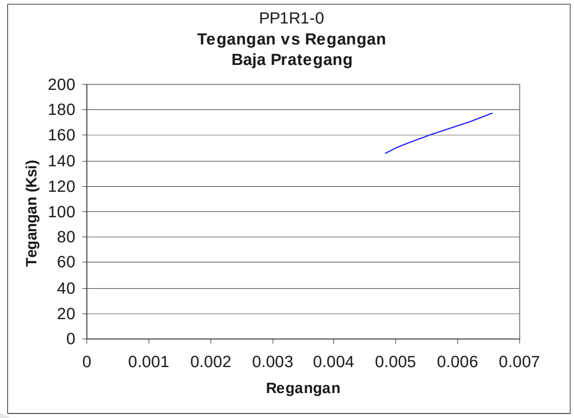
Grafik D.22.4. Tegangan vs regangan baja tulangan control beban balok PP1R1-0

Tegangan baja yang terjadi meningkat seiring dengan meningkatnya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.22.5. Tegangan baja prategang vs momen control beban balok PP1R1-0



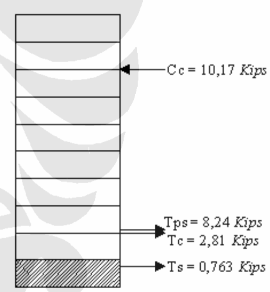
Grafik D.22.6. Tegangan vs regangan baja pratengang control beban balok PP1R1-0

Tegangan baja yang terjadi meningkat seiring dengan meningkatnya momen yang terjadi , terlihat bahwa baja prategang sudah memasuki tahap leleh pada saat struktur mengalami kegagalan

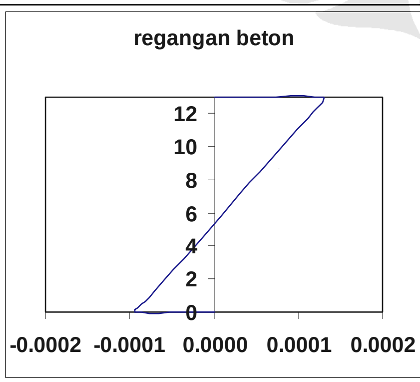
Retak awal Pada beton

P = 5,34 *Kips*

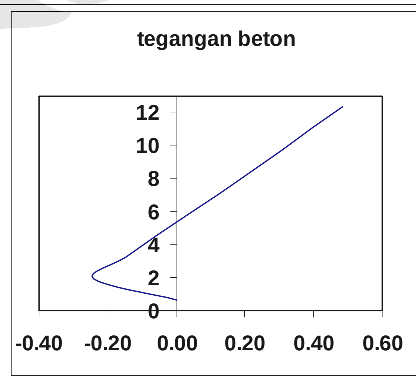
Lendutan = 0,0107 Inch



Gambar D.22.1. Gaya dalam balok PP1R1-0 pada retak awal



Grafik D.22.7. regangan beton balok PP1R1-0 pada retak awal

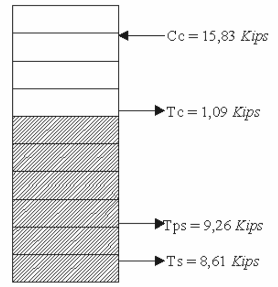


Grafik D.22.8. tegangan beton balok PP1R1-0 pada retak awal

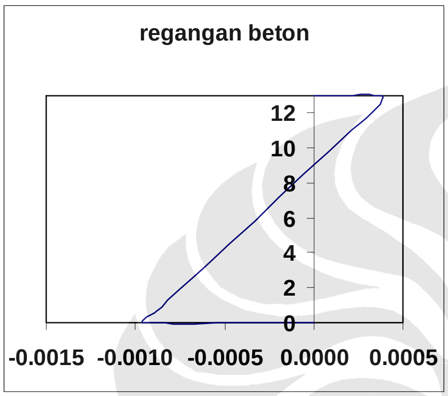
Leleh Pada Baja Prategang

P = 10,3 *Kips*

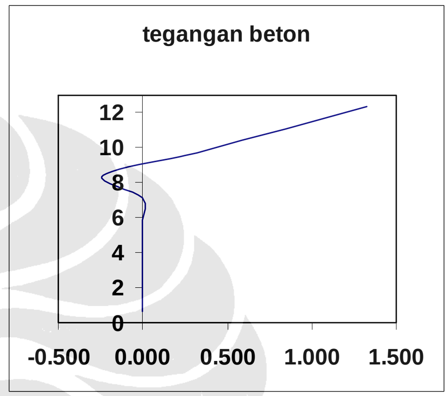
Lendutan = 0,06Inch



Gambar D.22.2. Gaya dalam balok PP1R1-0 pada leleh baja prategang



Grafik D.22.9. regangan beton balok PP1R1-0 pada leleh baja prategang

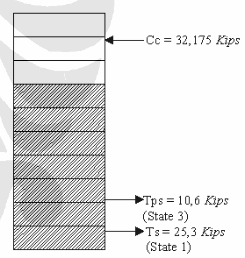


Grafik D.22.10. tegangan beton balok PP1R1-0 pada leleh baja prategang

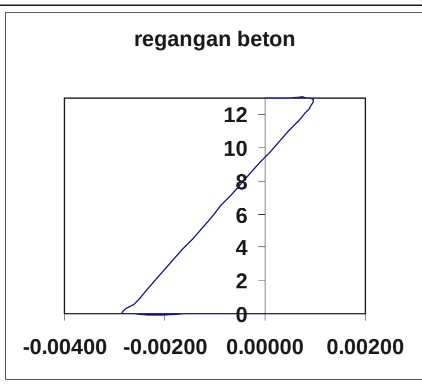
Ultimate

P = 21,4 *Kips*

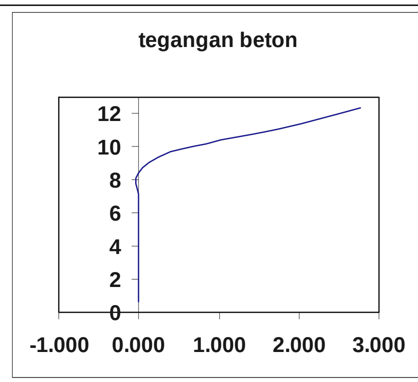
Lendutan = 0,18 Inch



Gambar D.22.3. Gaya dalam balok PP1R1-0 pada ultimate

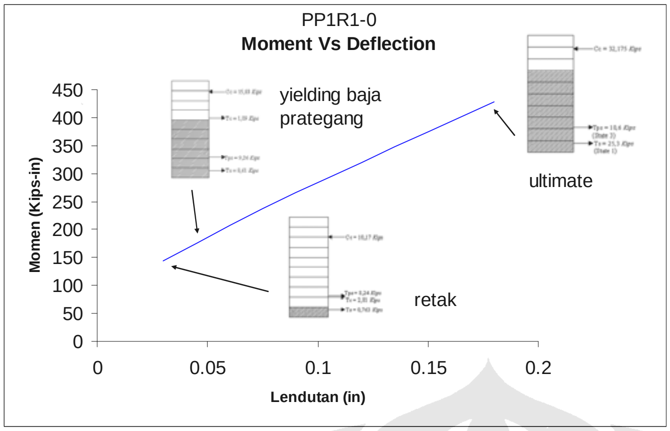


Grafik D.22.11. regangan beton balok PP1R1-0 pada ultimate



Grafik D.22.12. tegangan beton balok PP1R1-0 ultimate

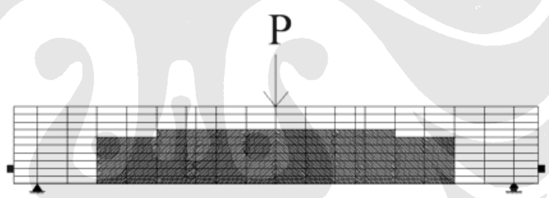
Tahapan Kerusakan Struktur



Grafik D.22.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP1R1-0

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang sudah mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

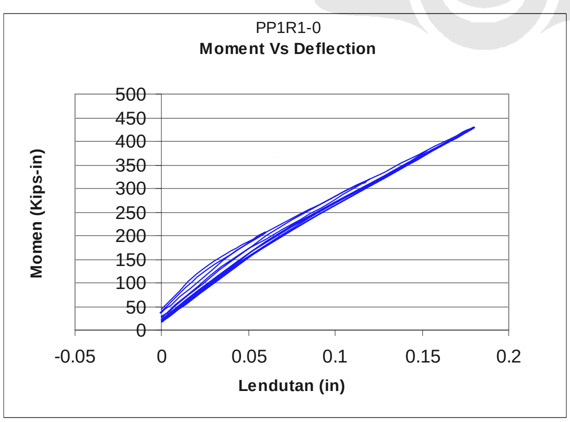
Retak pada beton pada saat ultimate



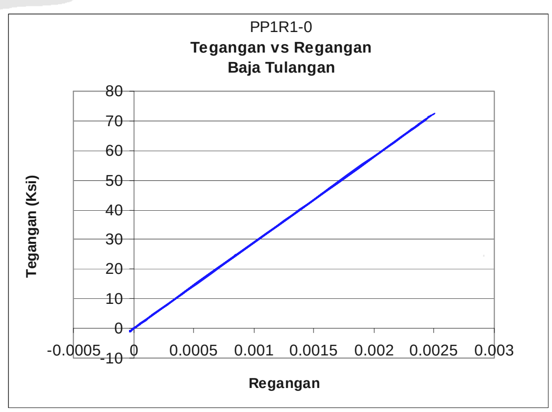
Gambar D.22.4. pola retak saat ultimate pada balok PP1R1-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

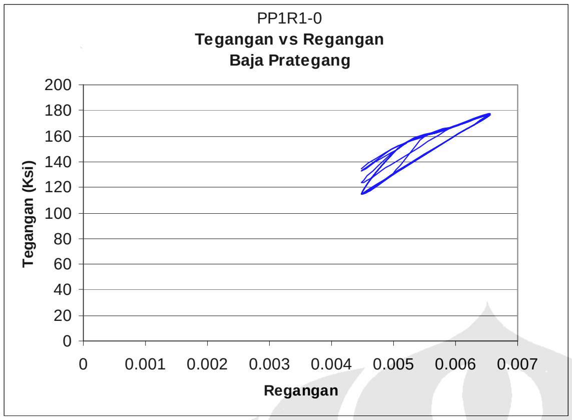


Grafik D.22.14. Momen vs lendutan beban semi siklik balok PP1R1-0



Grafik D.22.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP1R1-0

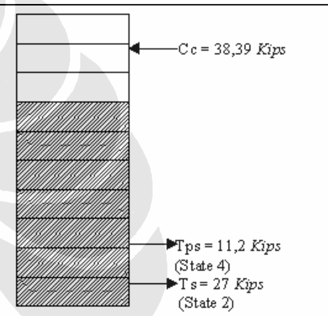
Tegangan vs Regangan Baja Prategang



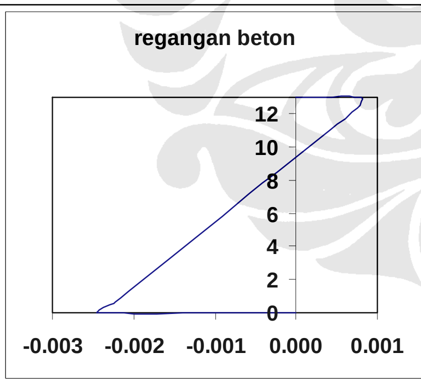
Grafik D.22.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP1R1-0

Kondisi Ultimate

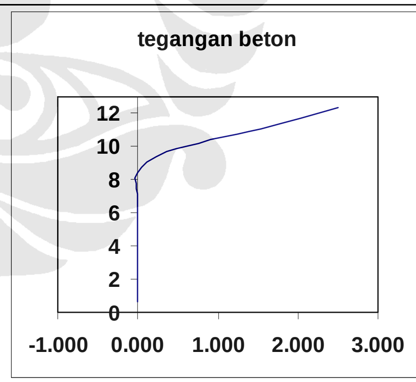
P	=	19	*Kips*
Lendutan	=	0,153	*Inch*



Gambar D.22.5. Gaya dalam balok PP1R1-0 pada beban semi siklik



Grafik D.22.17. regangan beton beban semi siklik balok PP1R1-0

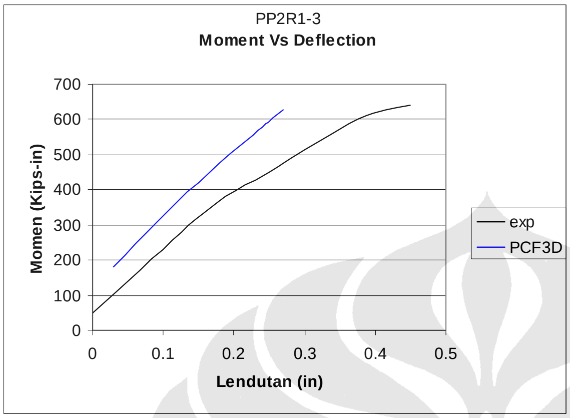


Grafik D.22.18. tegangan beton beban semi siklik balok PP1R1-0

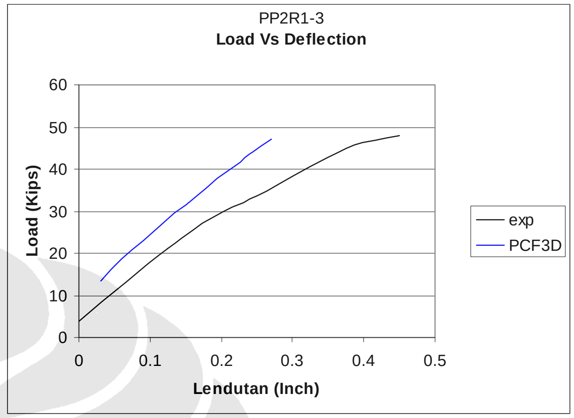
BALOK PP2R1-3

Beban Monotomik

OUPUT



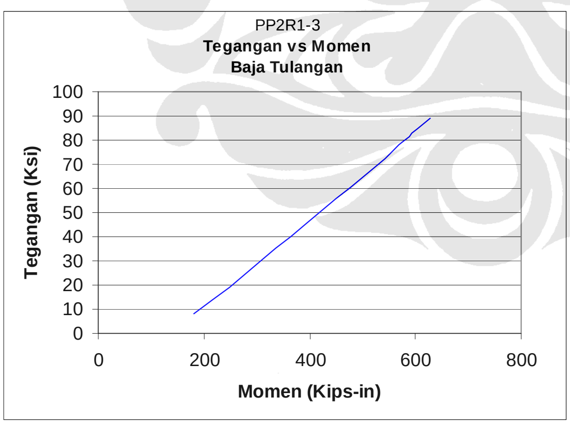
Grafik D.23.1. Momen vs lendutan control beban balok PP2R1-3



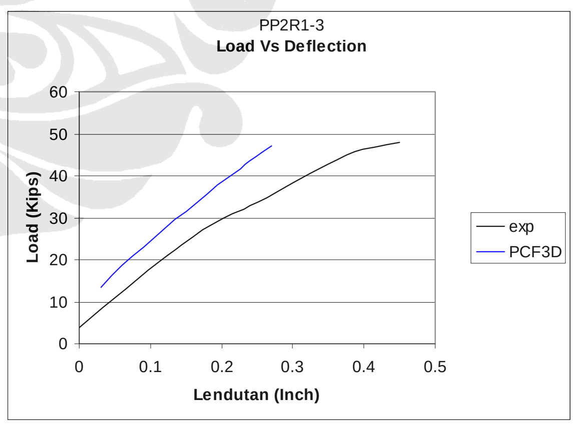
Grafik D.23.2. Beban vs lendutan control beban balok PP2R1-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



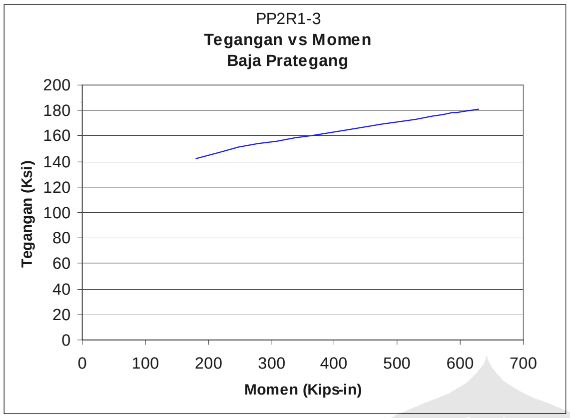
Grafik D.23.3. Tegangan baja tulangan vs momen control beban balok PP2R1-3



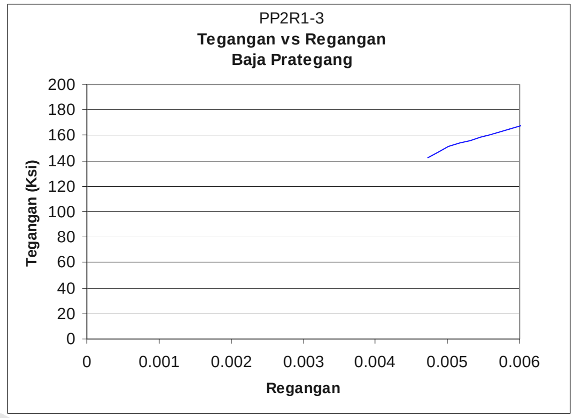
Grafik D.23.4. Tegangan vs regangan baja tulangan control beban balok PP2R1-3

Tegangan baja yang terjadi menigkat seiring momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.23.5. Tegangan baja prategang vs momen control beban balok PP2R1-3



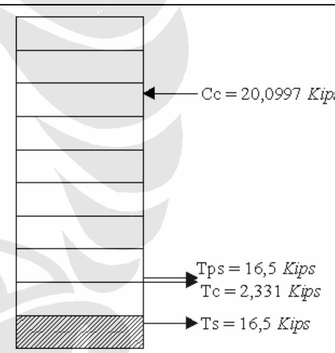
Grafik D.23.6. Tegangan vs regangan baja pratengang control beban balok PP2R1-3

Tegangan baja yang terjadi menigkat seiring momen yang terjadi, terlihat bahwa baja prategang sudah memasuki tahap leleh pada saat struktur mengalami kegagalan

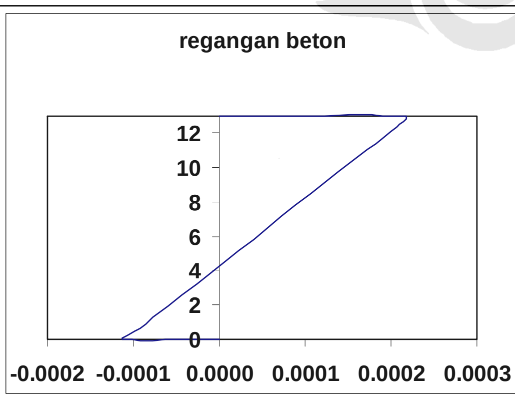
Retak awal Pada beton

P = 11,2 *Kips*

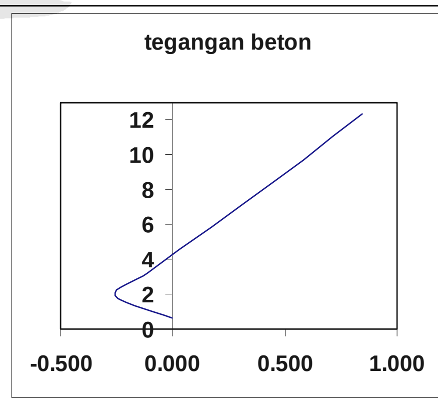
Lendutan = 0,015 Inch



Gambar D.23.1. Gaya dalam balok PP2R1-3 pada retak awal



Grafik D.23.7. regangan beton balok PP2R1-3 pada retak awal

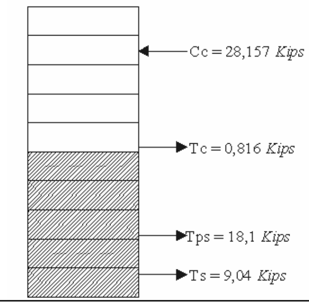


Grafik D.23.8. tegangan beton balok PP2R1-3 pada retak awal

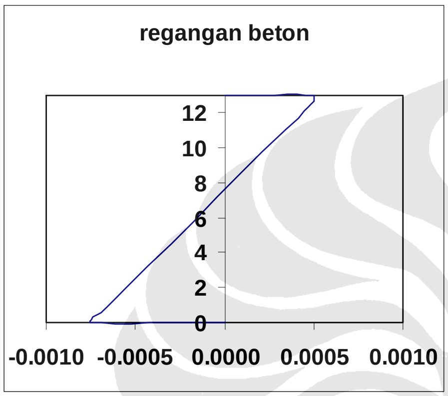
Leleh Pada Baja Prategang

P = 18,6 *Kips*

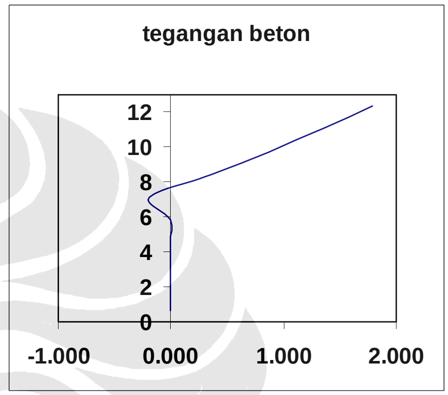
Lendutan = 0,06 Inch



Gambar D.23.2. Gaya dalam balok PP2R1-3 pada leleh baja prategang



Grafik D.23.9. regangan beton balok PP2R1-3 pada leleh baja prategang

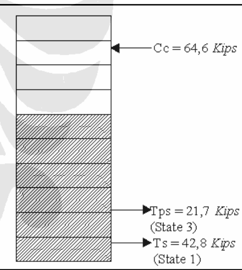


Grafik D.23.10. tegangan beton balok PP2R1-3 pada leleh baja prategang

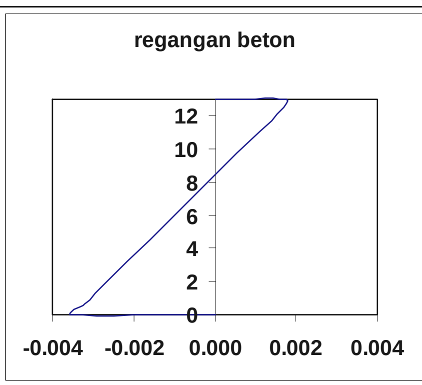
Ultimate

P = 47,1 *Kips*

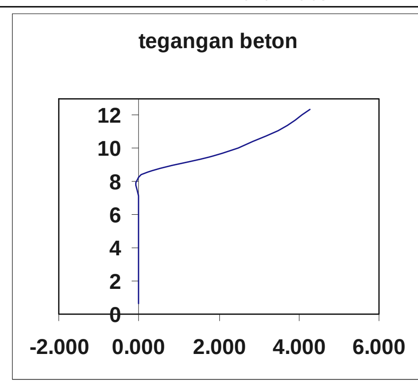
Lendutan = 0,27 Inch



Gambar D.23.3. Gaya dalam balok PP2R1-3 pada ultimate

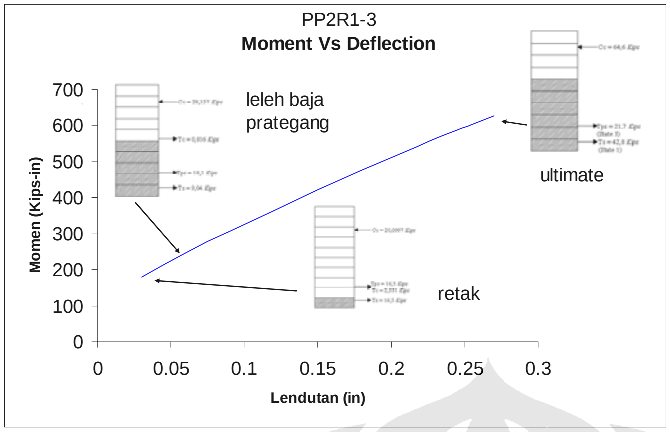


Grafik D.23.11. regangan beton balok PP2R1-3 pada ultimate



Grafik D.23.12. tegangan beton balok PP2R1-3 ultimate

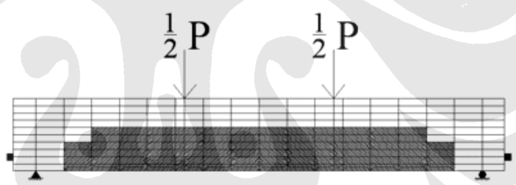
Tahapan Kerusakan Struktur



Grafik D.23.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP2R1-3

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat crushing pada beton

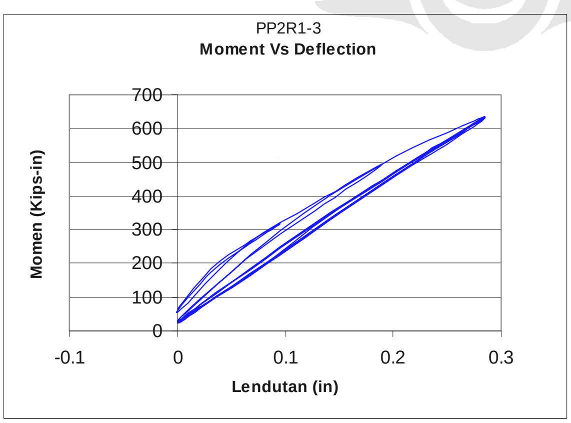
Retak pada beton pada saat ultimate



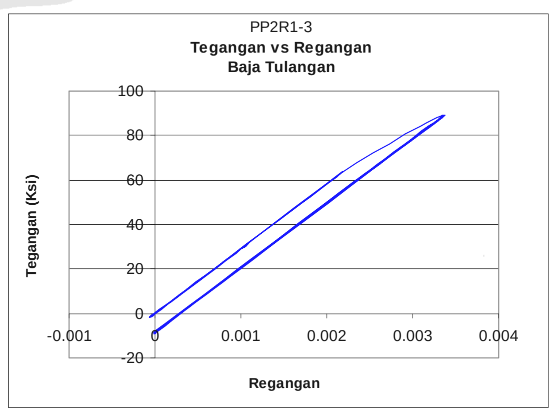
Gambar D.23.4. pola retak saat ultimate pada balok PP2R1-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

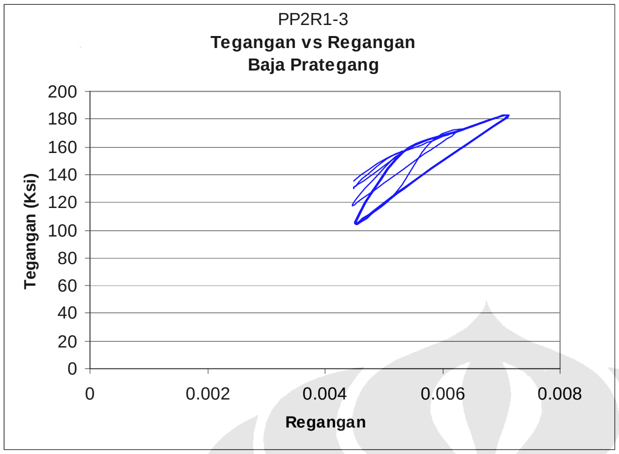


Grafik D.23.14. Momen vs lendutan beban semi siklik balok PP2R1-3



Grafik D.23.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP2R1-3

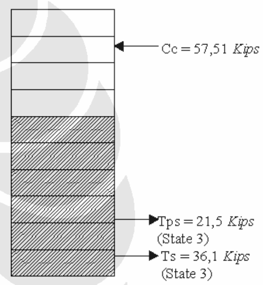
Tegangan vs Regangan Baja Prategang



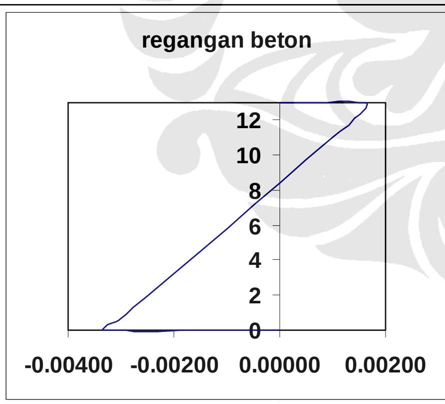
Grafik D.23.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP2R1-3

Kondisi Ultimate

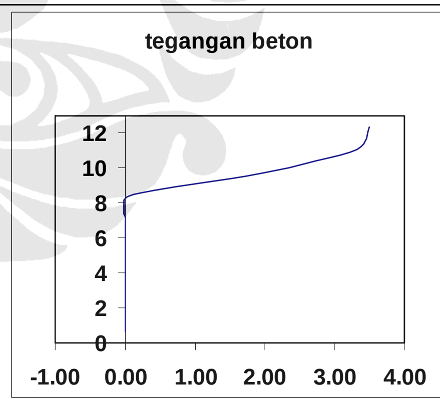
P	=	41,4	*Kips*
Lendutan	=	0,242	*Inch*



Gambar D.23.5. Gaya dalam balok PP2R1-3 pada beban semi siklik



Grafik D.23.17. regangan beton beban semi siklik balok PP2R1-3

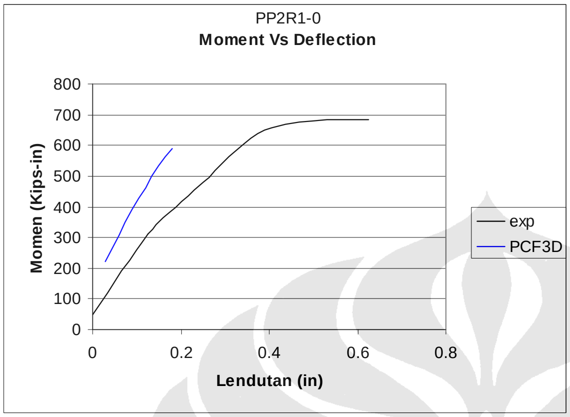


Grafik D.23.18. tegangan beton beban semi siklik balok PP2R1-3

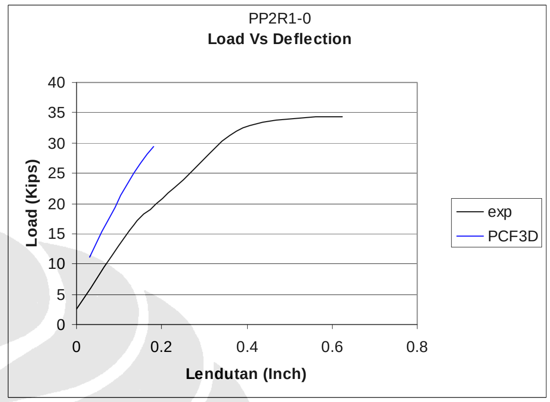
BALOK PP2R1-0

Beban Monotomik

OUPUT



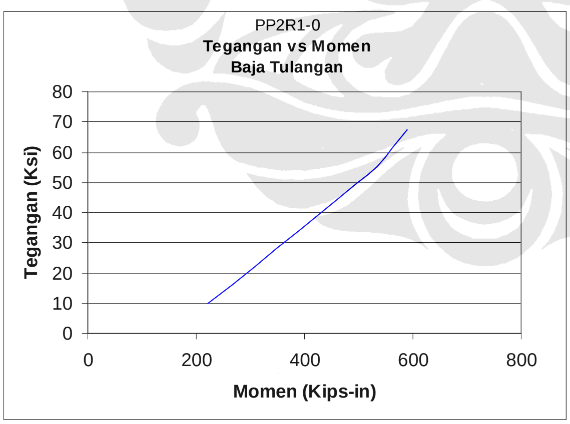
Grafik D.24.1. Momen vs lendutan control beban balok PP2R1-0



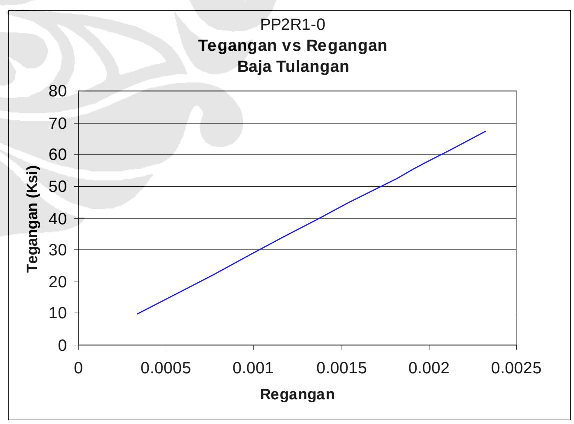
Grafik D.24.2. Beban vs lendutan control beban balok PP2R1-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



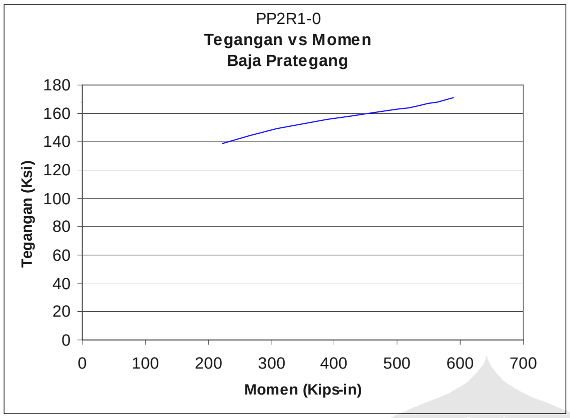
Grafik D.24.3. Tegangan baja tulangan vs momen control beban balok PP2R1-0



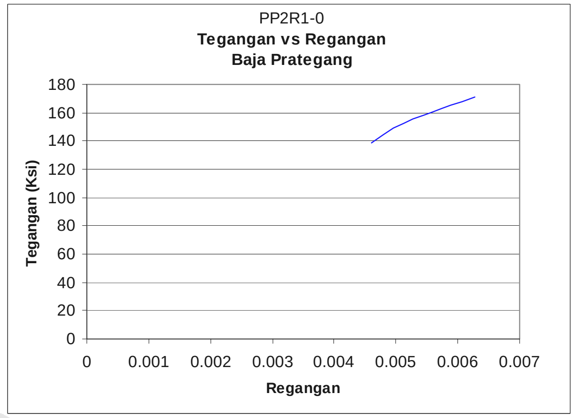
Grafik D.24.4. Tegangan vs regangan baja tulangan control beban balok PP2R1-0

Tegangan baja yang terjadi menigkat seiring dengan menigkatknya momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.24.5. Tegangan baja prategang vs momen control beban balok PP2R1-0



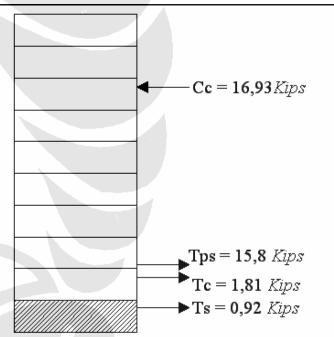
Grafik D.24.6. Tegangan vs regangan baja pratengang control beban balok PP2R1-0

Tegangan baja yang terjadi menigkat seiring dengan menigkatknya momen yang terjadi, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

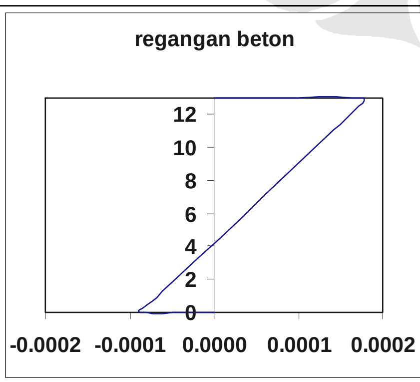
Retak awal Pada beton

P = 8,22 *Kips*

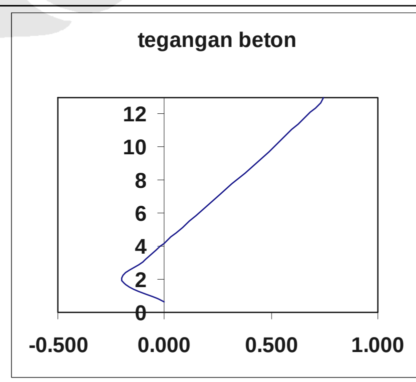
Lendutan = 0,0123 Inch



Gambar D.24.1. Gaya dalam balok PP2R1-0 pada retak awal



Grafik D.24.7. regangan beton balok PP2R1-0 pada retak awal

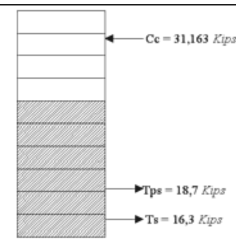


Grafik D.24.8. tegangan beton balok PP2R1-0 pada retak awal

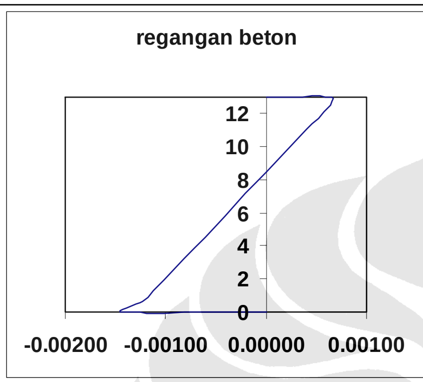
Leleh Pada Baja Prategang

P = 19,4 *Kips*

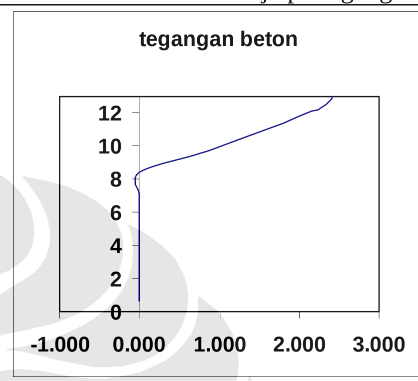
Lendutan = 0,09 Inch



Gambar D.24.2. Gaya dalam balok PP2R1-0 pada leleh baja prategang



Grafik D.24.9. regangan beton balok PP2R1-0 pada leleh baja prategang

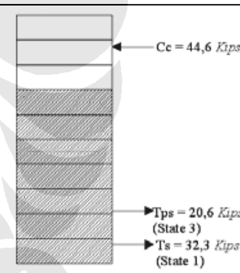


Grafik D.24.10. tegangan beton balok PP2R1-0 pada leleh baja prategang

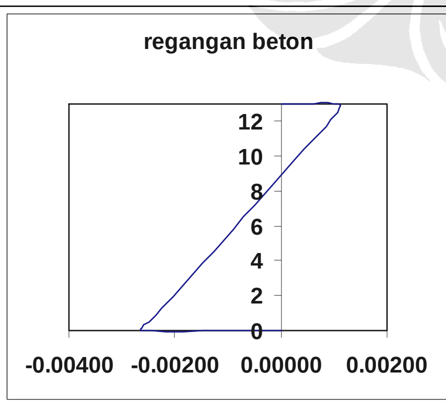
Ultimate

P = 29,4 *Kips*

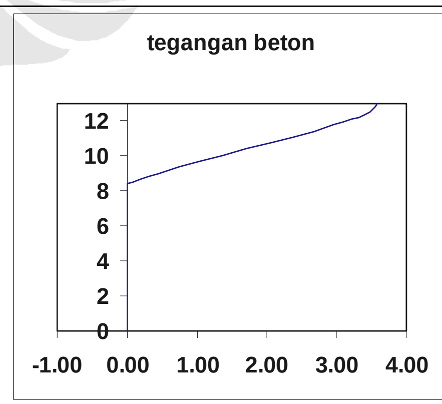
Lendutan = 0,18 Inch



Gambar D.24.3. Gaya dalam balok PP2R1-0 pada ultimate

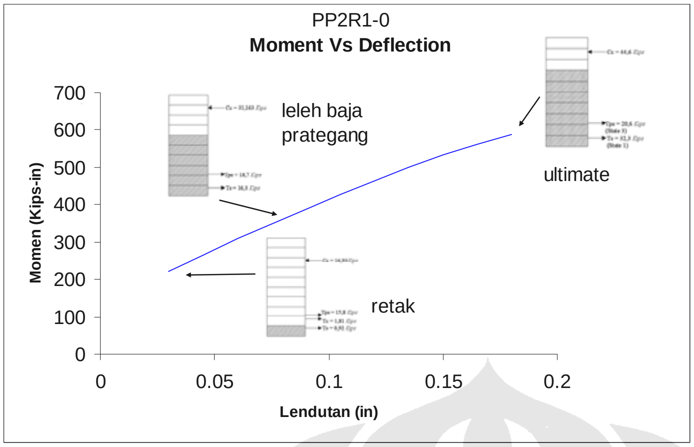


Grafik D.24.11. regangan beton balok PP2R1-0 pada ultimate



Grafik D.24.12. tegangan beton balok PP2R1-0 ultimate

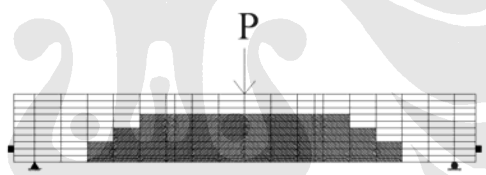
Tahapan Kerusakan Struktur



Grafik D.24.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP2R1-0

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang sudah mengalami kelelehan dan kegagalan yang terjadi akibat matriks kekakuan struktur yang menjadi tidak stabil.

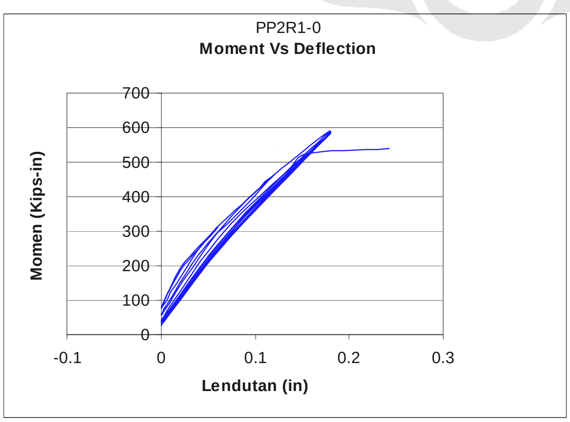
Retak pada beton pada saat ultimate



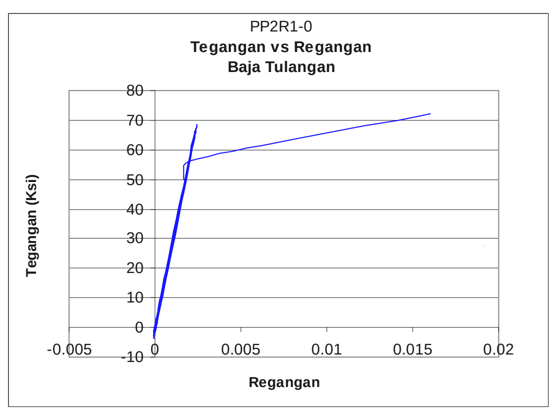
Gambar D.24.4. pola retak saat ultimate pada balok PP2R1-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

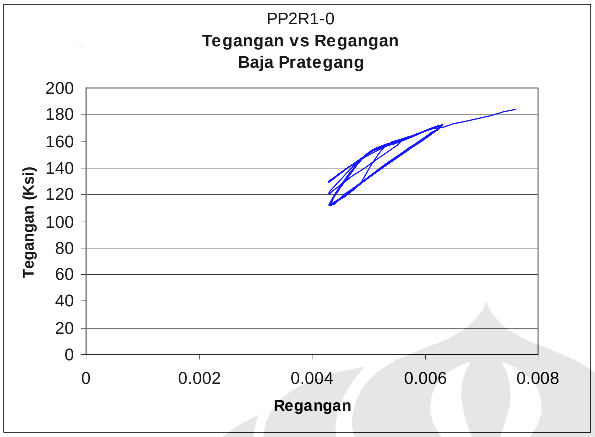


Grafik D.24.14. Momen vs lendutan beban semi siklik balok PP2R1-0



Grafik D.24.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP2R1-0

Tegangan vs Regangan Baja Prategang

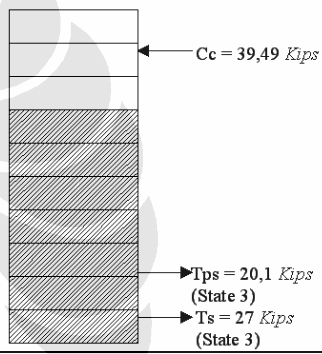


Grafik D.24.6. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP2R1-0

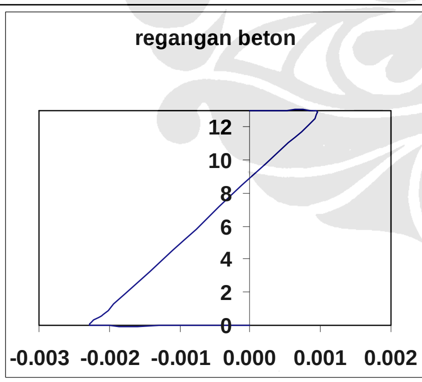
Kondisi Ultimate

P = 26,2 *Kips*

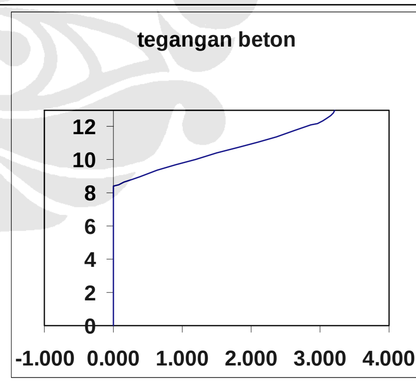
Lendutan = 0,153 *Inch*



Gambar D.24.5. Gaya dalam balok PP2R1-0 pada beban semi siklik



Grafik D.24.17. regangan beton beban semi siklik balok PP2R1-0

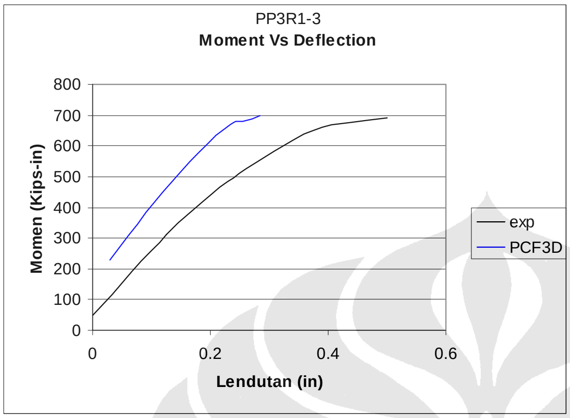


Grafik D.24.18. tegangan beton beban semi siklik balok PP2R1-0

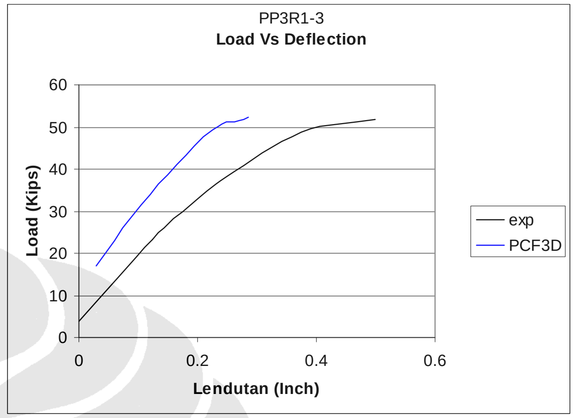
BALOK PP3R1-3

Beban Monotomik

OUPUT



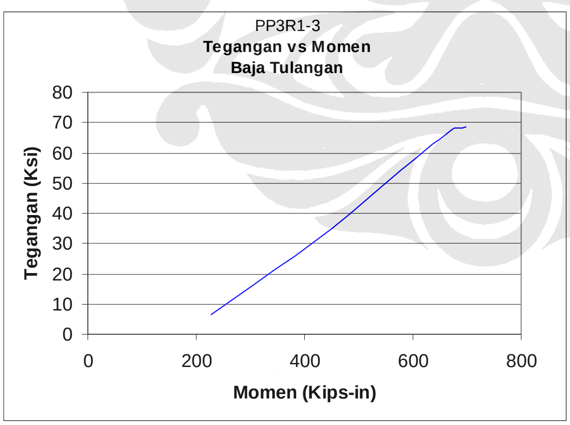
Grafik D.25.1. Momen vs lendutan control beban balok PP3R1-3



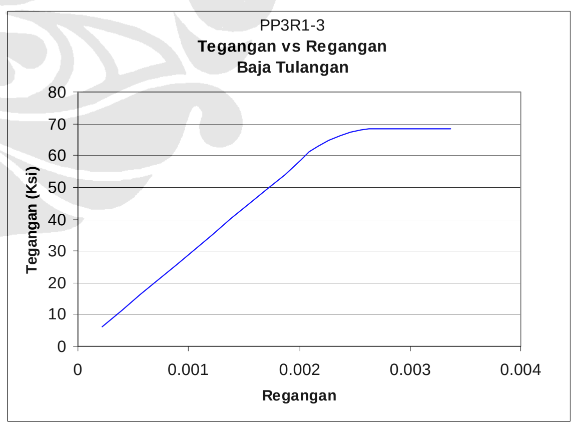
Grafik D.25.2. Beban vs lendutan control beban balok PP3R1-3

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



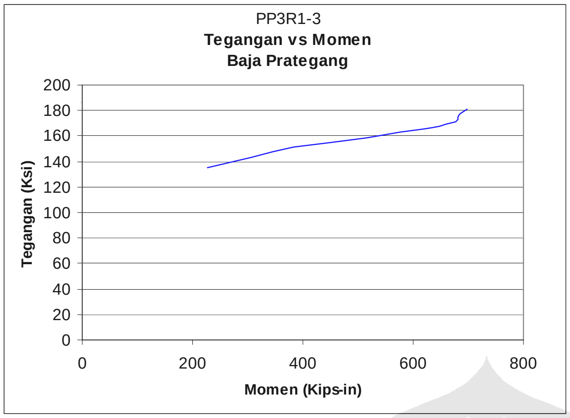
Grafik D.25.3. Tegangan baja tulangan vs momen control beban balok PP3R1-3



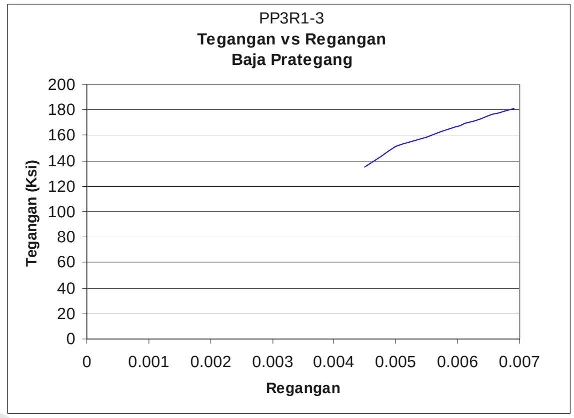
Grafik D.25.4. Tegangan vs regangan baja tulangan control beban balok PP3R1-3

Tegangan baja yang terjadi menigkat seiring momen yang terjadi, terlihat bahwa baja tulangan sudah dalam keadaan leleh pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.25.5. Tegangan baja prategang vs momen control beban balok PP3R1-3



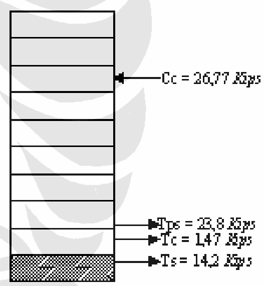
Grafik D.25.6. Tegangan vs regangan baja pratengang control beban balok PP3R1-3

Tegangan baja yang terjadi menigkat seiring momen yang terjadi, terlihat bahwa baja prategang sudah memasuki tahap leleh pada saat struktur mengalami kegagalan

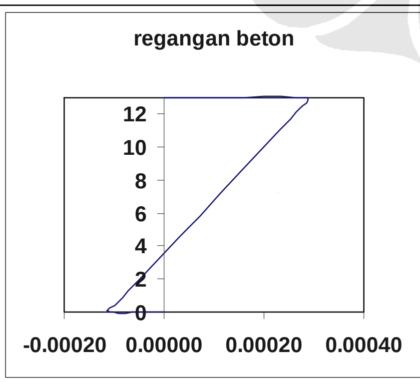
Retak awal Pada beton

P = 14,4 *Kips*

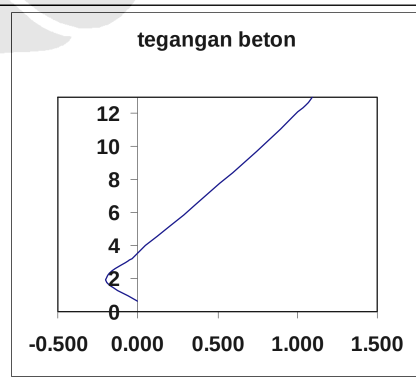
Lendutan = 0,018 Inch



Gambar D.25.1. Gaya dalam balok PP3R1-3 pada retak awal



Grafik D.25.7. regangan beton balok PP3R1-3 pada retak awal

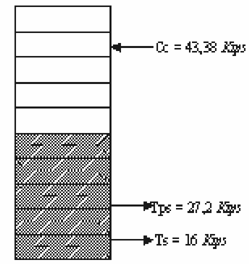


Grafik D.25.8. tegangan beton balok PP3R1-3 pada retak awal

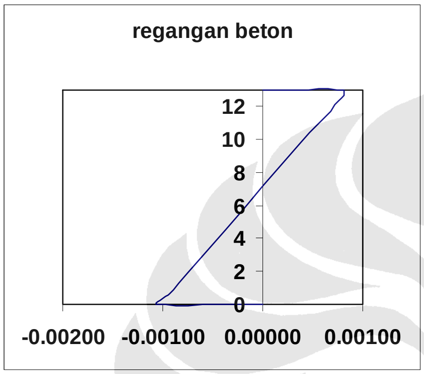
Leleh Pada Baja Prategang

P = 28,7 *Kips*

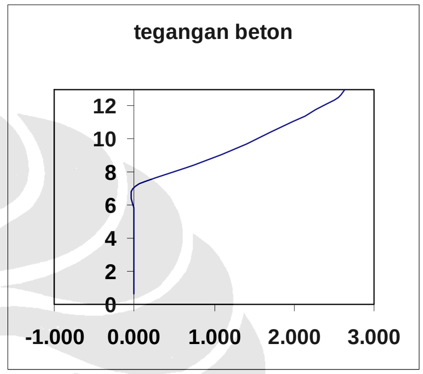
Lendutan = 0,09 Inch



Gambar D.25.2. Gaya dalam balok PP3R1-3 pada leleh baja prategang



Grafik D.25.9. regangan beton balok PP3R1-3 pada leleh baja prategang

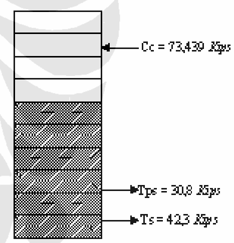


Grafik D.25.10. tegangan beton balok PP3R1-3 pada leleh baja prategang

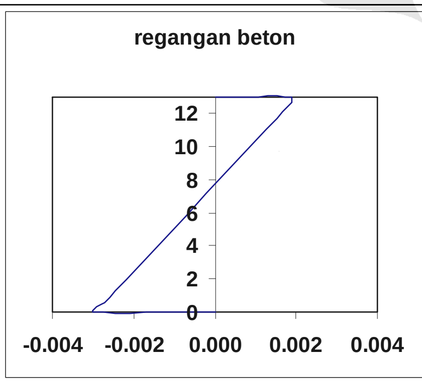
Leleh baja tulangan

P = 28,7 *Kips*

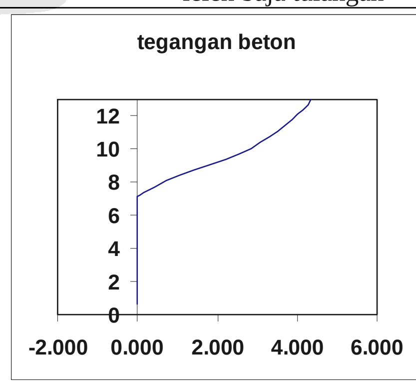
Lendutan = 0,09 Inch



Gambar D.25.3. Gaya dalam balok PP3R1-0 pada leleh baja tulangan



Grafik D.25.11. regangan beton balok PP3R1-3 pada leleh baja tulangan

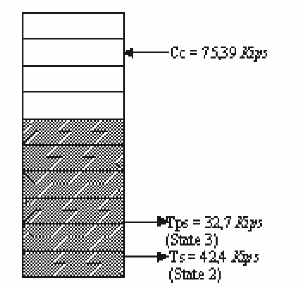


Grafik D.25.12. tegangan beton balok PP3R1-3 leleh baja tulangan

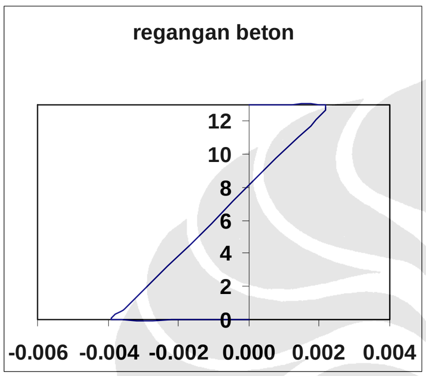
Ultimate

P = 52,4 *Kips*

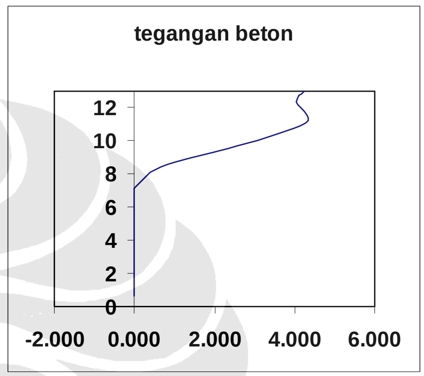
Lendutan = 0,285 Inch



Gambar D.25.4. Gaya dalam balok PP3R1-3 pada ultimate

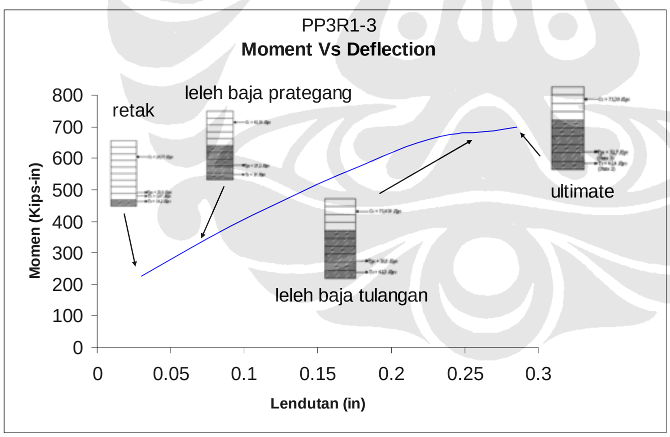


Grafik D.25.13. regangan beton balok PP3R1-3 pada ultimate



Grafik D.25.14. tegangan beton balok PP3R1-3 ultimate

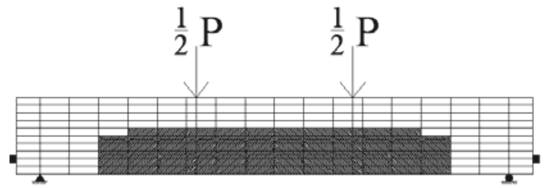
Tahapan Kerusakan Struktur



Grafik D.25.15. Momen vs lendutan tahapan kerusakan struktur beban balok PP3R1-3

Tterlihat pada saat kegagalan baja tulangan dan baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat crushing pada beton.

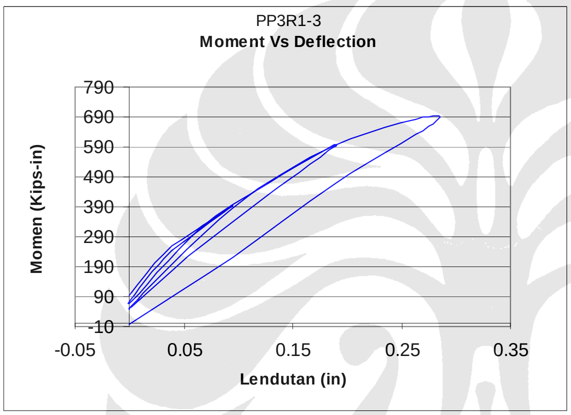
Retak pada beton pada saat ultimate



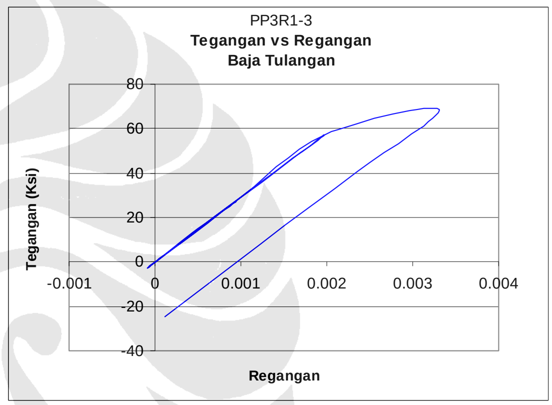
Gambar D.25.5. pola retak saat ultimate pada balok PP3R1-3

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

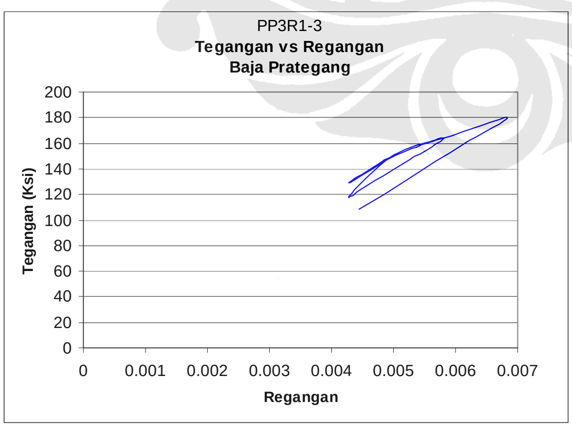


Grafik D.25.16. Momen vs lendutan beban semi siklik balok PP3R1-3



Grafik D.25.17. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP3R1-3

Tegangan vs Regangan Baja Prategang

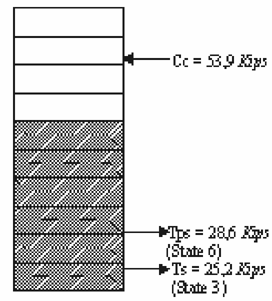


Grafik D.25.18. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP3R1-3

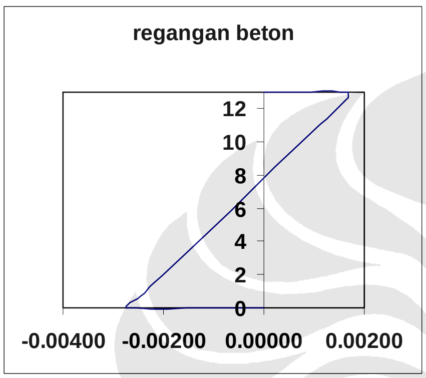
Kondisi Ultimate

P = 35,3 *Kips*

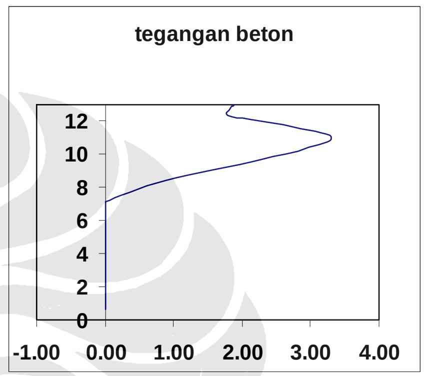
Lendutan = 0,19 *Inch*



Gambar D.25.6. Gaya dalam balok PP3R1-0 pada beban semi siklik



Grafik D.25.19. regangan beton beban semi siklik balok PP3R1-3

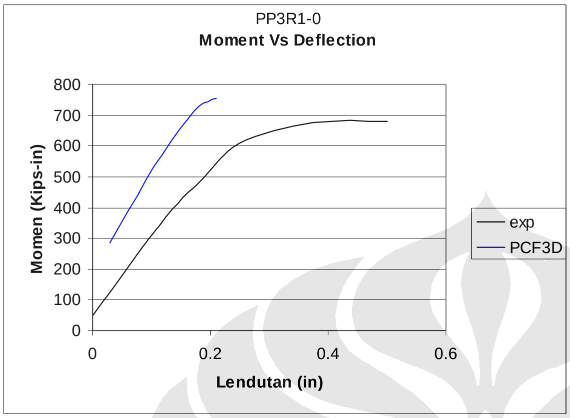


Grafik D.25.20. tegangan beton beban semi siklik balok PP3R1-3

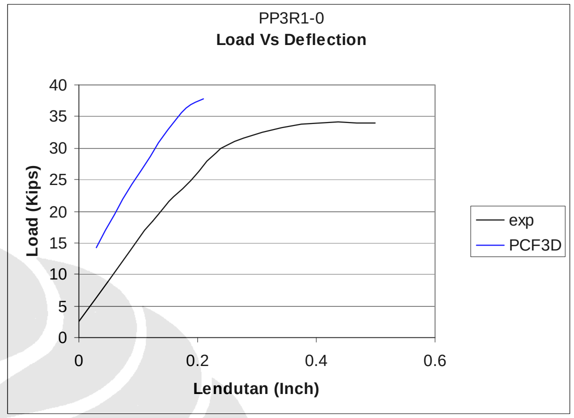
BALOK PP3R1-0

Beban Monotomik

OUPUT



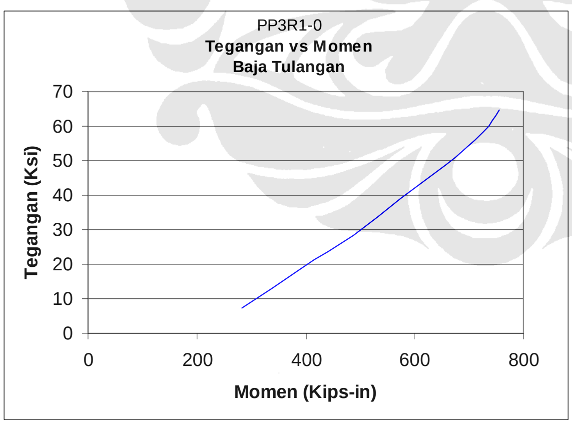
Grafik D.26.1. Momen vs lendutan control beban balok PP3R1-0



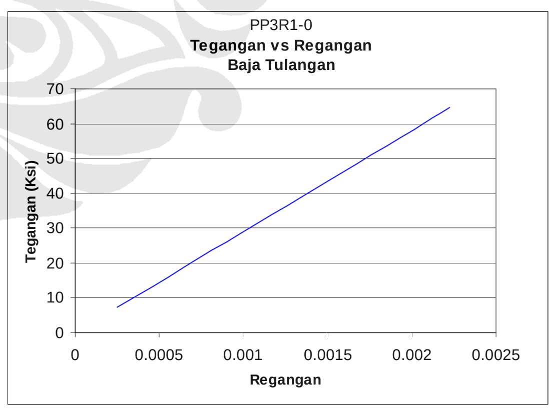
Grafik D.26.2. Beban vs lendutan control beban balok PP3R1-0

Terlihat bahwa hasil output dari program PCF3D mendekati hasil yang didapatkan dari percobaan.

Tegangan Baja



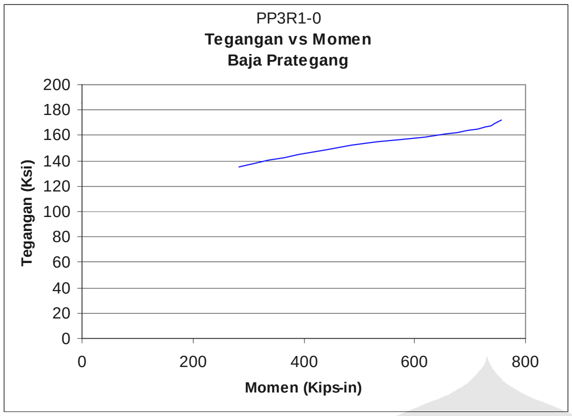
Grafik D.26.3. Tegangan baja tulangan vs momen control beban balok PP3R1-0



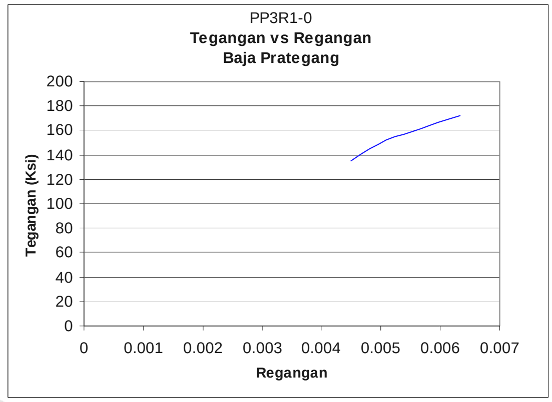
Grafik D.26.4. Tegangan vs regangan baja tulangan control beban balok PP3R1-0

Tegangan baja yang terjadi meningkat seiring momen yang terjadi, terlihat bahwa baja tulangan masih dalam keadaan elastis pada saat struktur mengalami kegagalan

Tegangan Baja Prategang



Grafik D.26.5. Tegangan baja prategang vs momen control beban balok PP3R1-0



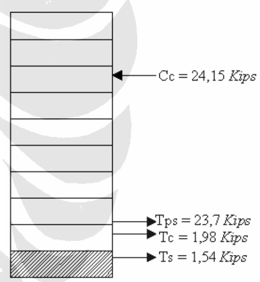
Grafik D.26.6. Tegangan vs regangan baja pratengang control beban balok PP3R1-0

Tegangan baja yang terjadi meningkat seiring momen yang terjadi, terlihat bahwa baja prategang baru memasuki tahap leleh pada saat struktur mengalami kegagalan

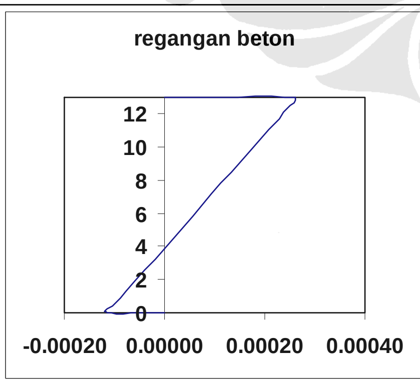
Retak awal Pada beton

P = 11,7 *Kips*

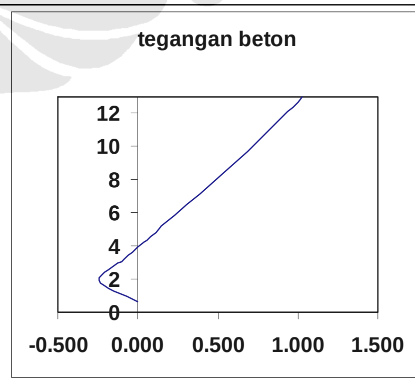
Lendutan = 0,018 Inch



Gambar D.26.1. Gaya dalam balok PP3R1-0 pada retak awal



Grafik D.26.7. regangan beton balok PP3R1-0 pada retak awal

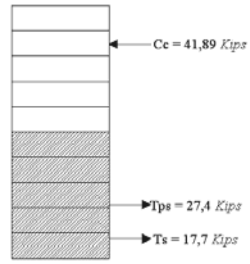


Grafik D.26.8. tegangan beton balok PP3R1-0 pada retak awal

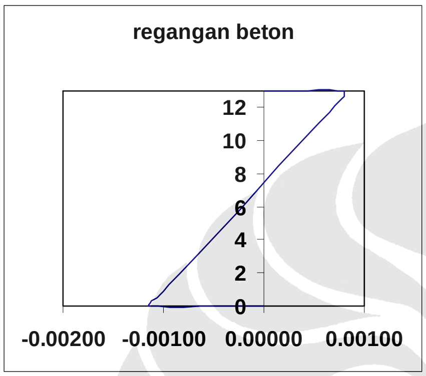
Leleh Pada Baja Prategang

P = 24,3 *Kips*

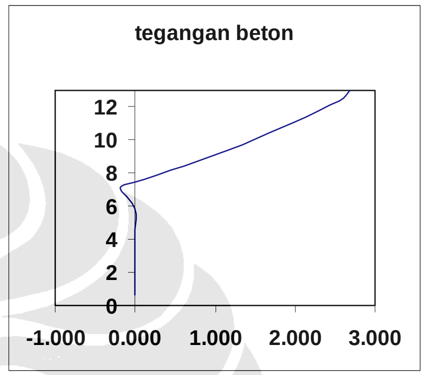
Lendutan = 0,09 Inch



Gambar D.26.2. Gaya dalam balok PP3R1-0 pada leleh baja prategang



Grafik D.26.9. regangan beton balok PP3R1-0 pada leleh baja prategang

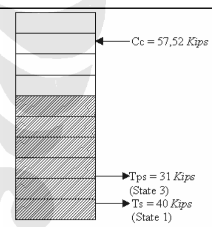


Grafik D.26.10. tegangan beton balok PP3R1-0 pada leleh baja prategang

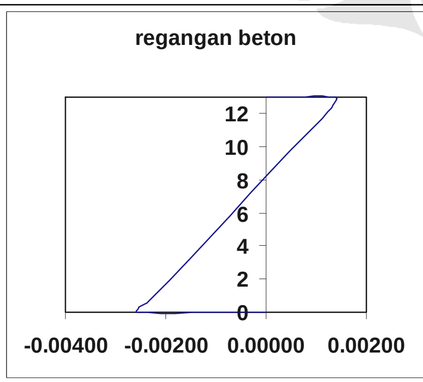
Ultimate

P = 37,8 *Kips*

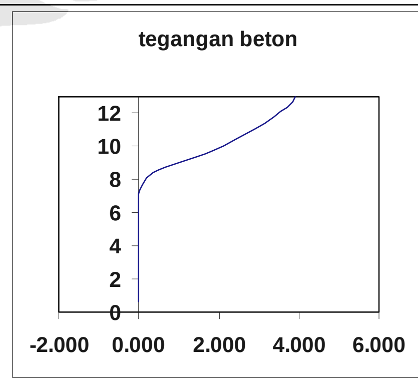
Lendutan = 0,21 Inch



Gambar D.26.3. Gaya dalam balok PP3R1-0 pada ultimate

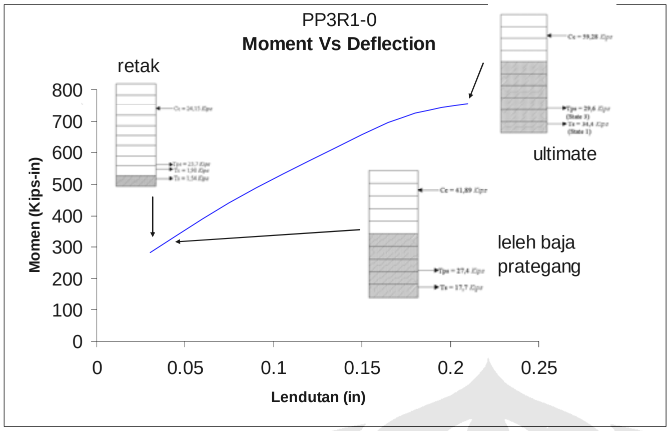


Grafik D.26.11. regangan beton balok PP3R1-0 pada ultimate



Grafik D.26.12. tegangan beton balok PP3R1-0 ultimate

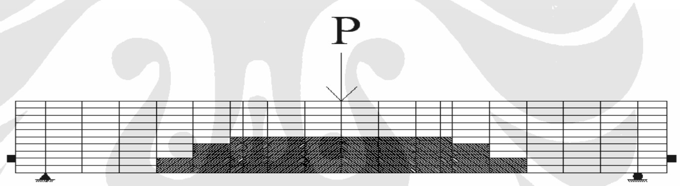
Tahapan Kerusakan Struktur



Grafik D.26.13. Momen vs lendutan tahapan kerusakan struktur beban balok PP3R1-0

Terlihat pada saat kegagalan baja tulangan belum mengalami kelelehan sementara baja prategang baru mengalami kelelehan dan kegagalan yang terjadi akibat Crushing pada beton

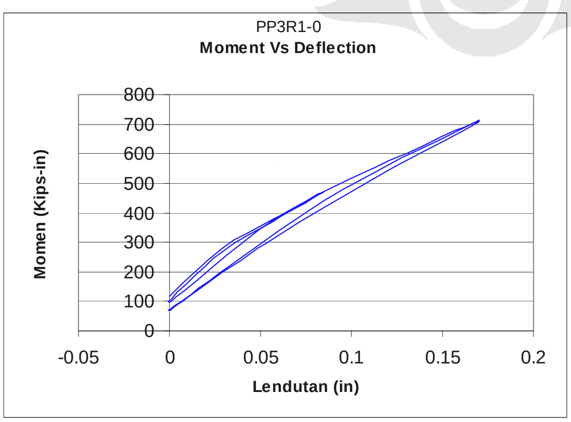
Retak pada beton pada saat ultimate



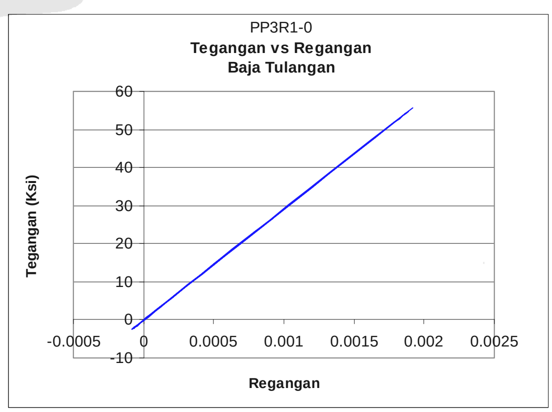
Gambar D.26.4. pola retak saat ultimate pada balok PP3R1-0

Terlihat dari pola retak yang terjadi kegagalan yang terjadi adalah kegagalan akibat lentur

Beban Semi Siklik

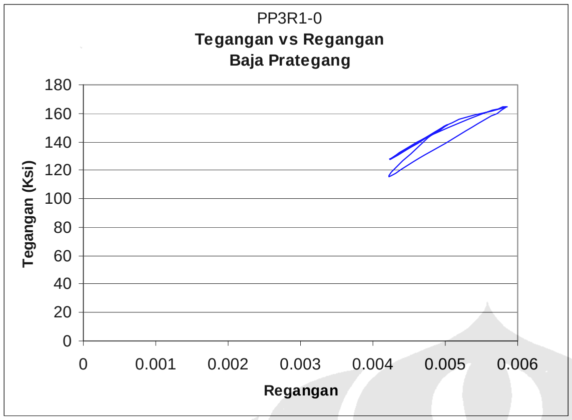


Grafik D.26.14. Momen vs lendutan beban semi siklik balok PP3R1-0



Grafik D.26.15. Tegangan vs regangan baja tulangan akibat beban semi siklik balok PP3R1-0

Tegangan vs Regangan Baja Prategang

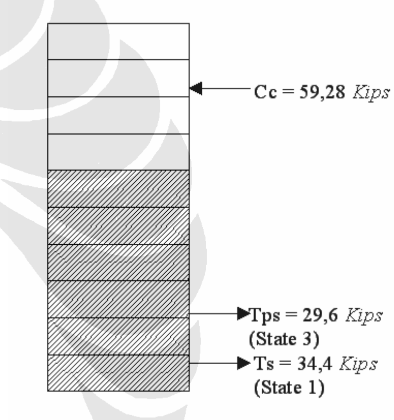


Grafik D.26.16. Tegangan vs regangan baja prategang akibat beban semi siklik balok PP3R1-0

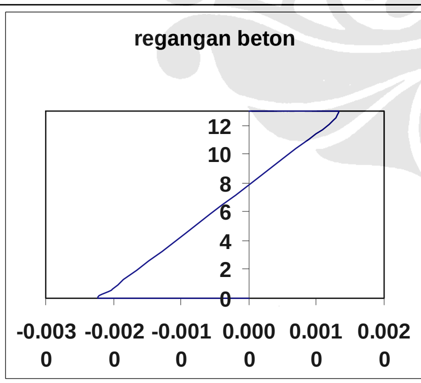
Kondisi Ultimate

P = 35,7 *Kips*

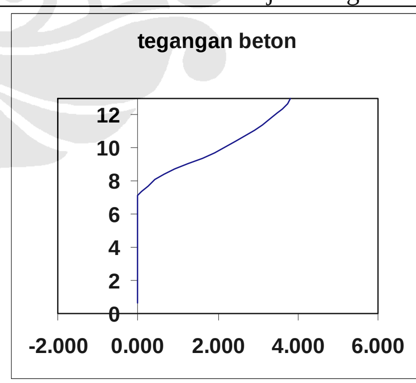
Lendutan = 0,17 *Inch*



Gambar D.26.5. Gaya dalam balok PP3R1-0 pada leleh baja tulangan



Grafik D.26.17. regangan beton beban semi siklik balok PP3R1-0



Grafik D.26.18. tegangan beton beban semi siklik balok PP3R1-0