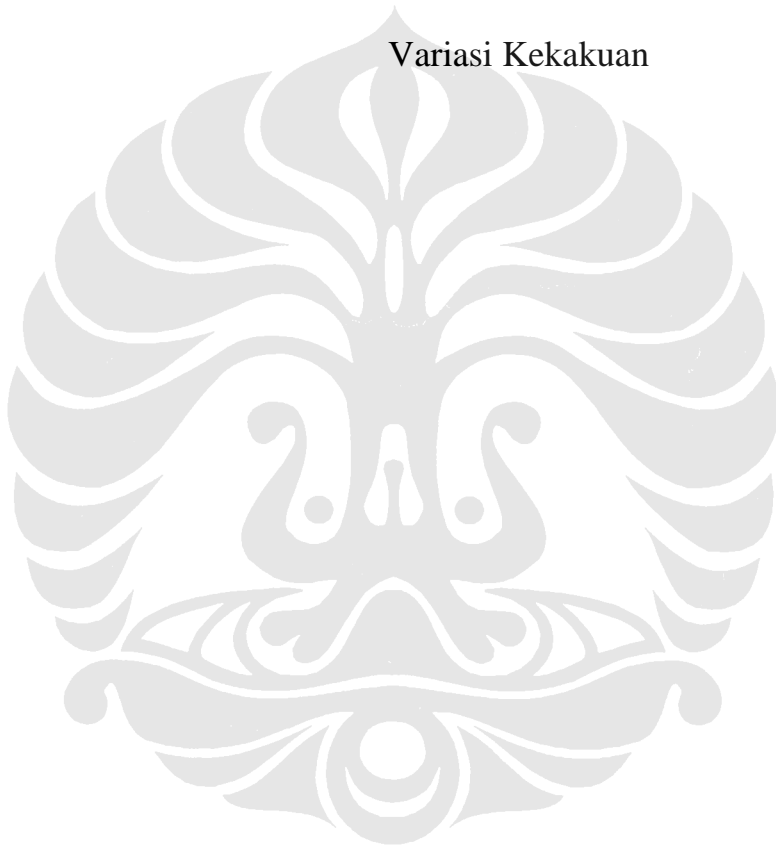


## **LAMPIRAN A**

### **SIMULASI 1**

#### **Variasi Kekakuan**

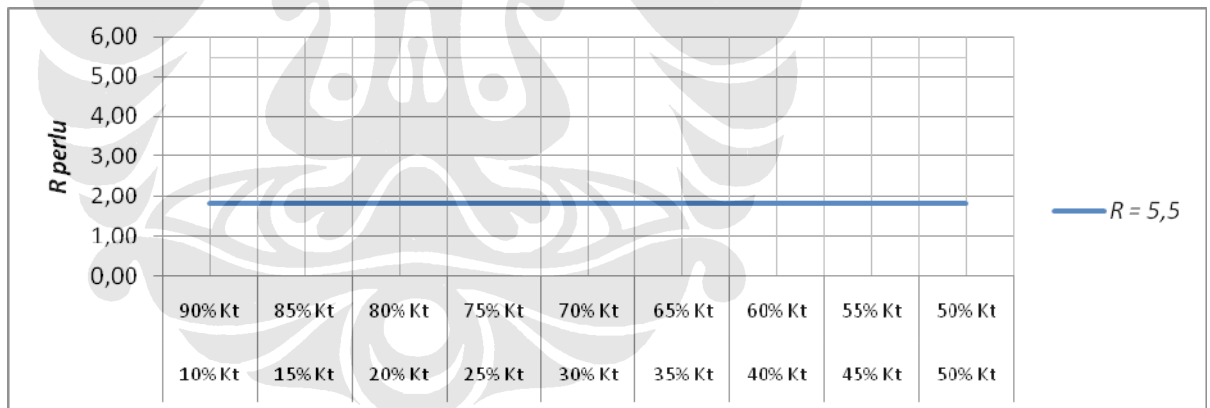


LAMPIRAN A - 1

## LAMPIRAN A. SIMULASI 1

Variasi kekakuan, dengan  $R = 5,5$ . Pada kondisi  $T_n = T_g$ .

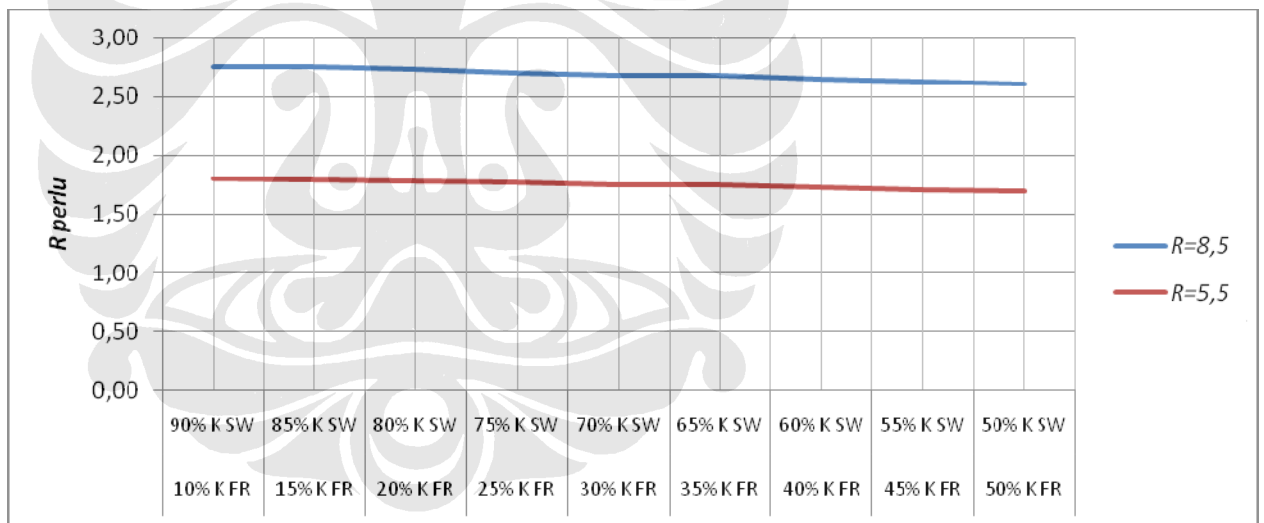
Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$R^*_{SW}$	$R_{FR}$	$R_{SW}$
10% $K_{total}$	90% $K_{total}$	1.82	1.82	5.5	5.5
15% $K_{total}$	85% $K_{total}$	1.82	1.82	5.5	5.5
20% $K_{total}$	80% $K_{total}$	1.82	1.82	5.5	5.5
25% $K_{total}$	75% $K_{total}$	1.82	1.82	5.5	5.5
30% $K_{total}$	70% $K_{total}$	1.82	1.82	5.5	5.5
35% $K_{total}$	65% $K_{total}$	1.82	1.82	5.5	5.5
40% $K_{total}$	60% $K_{total}$	1.82	1.82	5.5	5.5
45% $K_{total}$	55% $K_{total}$	1.82	1.82	5.5	5.5
50% $K_{total}$	50% $K_{total}$	1.82	1.82	5.5	5.5



Gambar L.1 Variasi Kekakuan dengan  $R = 5,5$ , pada  $T_n = T_g$

Variasi kekakuan, dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ . Pada kondisi  $T_n = T_g$ .

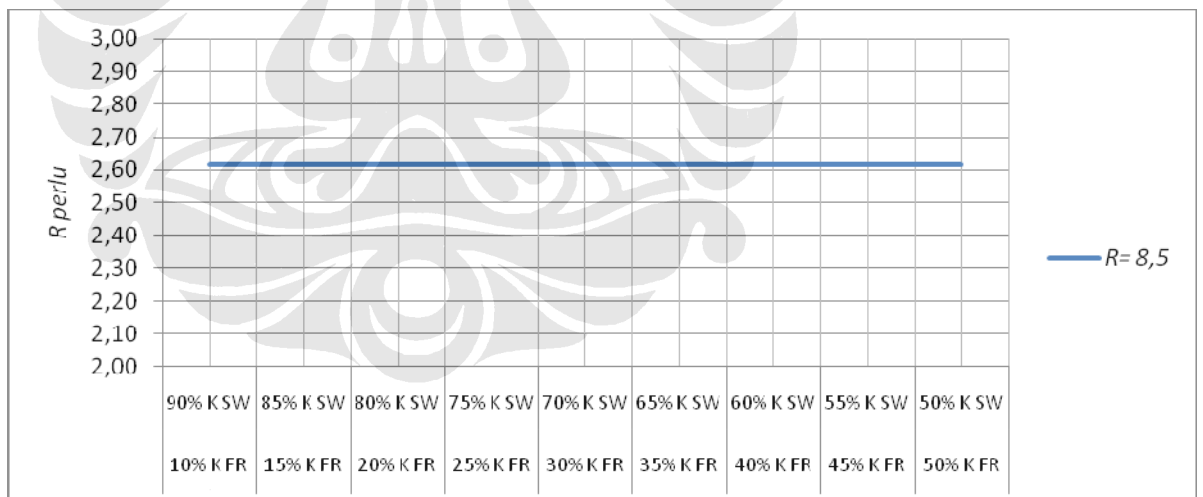
Kekakuan		R perlu		R desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	2.75	1.80	8.5	5.5
15% $K_{total}$	85% $K_{total}$	2.76	1.79	8.5	5.5
20% $K_{total}$	80% $K_{total}$	2.73	1.78	8.5	5.5
25% $K_{total}$	75% $K_{total}$	2.71	1.77	8.5	5.5
30% $K_{total}$	70% $K_{total}$	2.68	1.75	8.5	5.5
35% $K_{total}$	65% $K_{total}$	2.68	1.74	8.5	5.5
40% $K_{total}$	60% $K_{total}$	2.66	1.72	8.5	5.5
45% $K_{total}$	55% $K_{total}$	2.64	1.71	8.5	5.5
50% $K_{total}$	50% $K_{total}$	2.61	1.69	8.5	5.5



**Gambar L.2** Variasi kekakuan, dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ . Pada kondisi  $T_n = T_g$

Variasi kekakuan, dengan  $R = 8,5$ . Pada kondisi  $T_n = T_g$ .

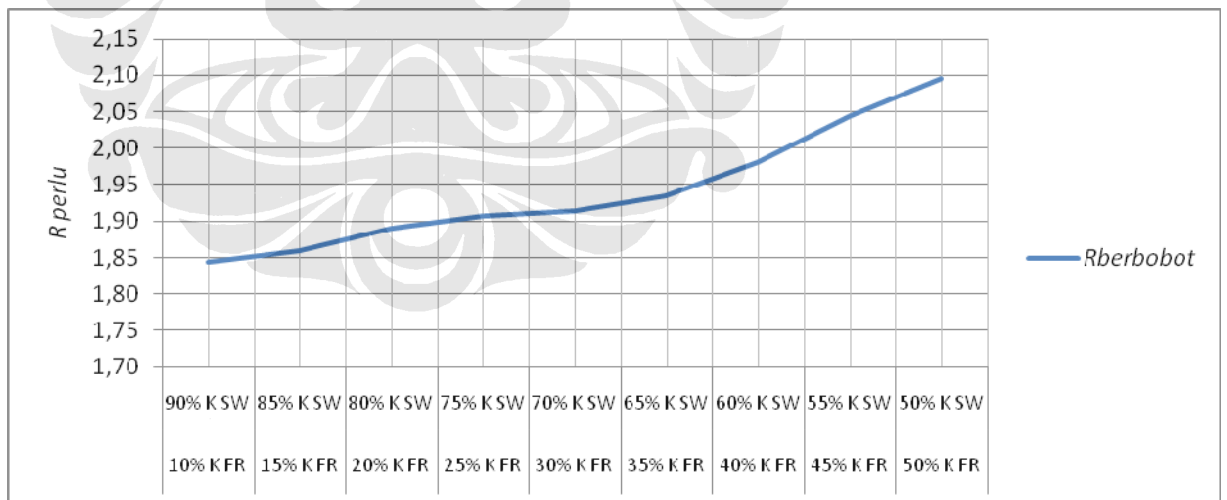
Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	2.61	2.61	8.5	8.5
15% $K_{total}$	85% $K_{total}$	2.61	2.61	8.5	8.5
20% $K_{total}$	80% $K_{total}$	2.61	2.61	8.5	8.5
25% $K_{total}$	75% $K_{total}$	2.61	2.61	8.5	8.5
30% $K_{total}$	70% $K_{total}$	2.61	2.61	8.5	8.5
35% $K_{total}$	65% $K_{total}$	2.61	2.61	8.5	8.5
40% $K_{total}$	60% $K_{total}$	2.61	2.61	8.5	8.5
45% $K_{total}$	55% $K_{total}$	2.61	2.61	8.5	8.5
50% $K_{total}$	50% $K_{total}$	2.61	2.61	8.5	8.5



**Gambar L.3** Variasi kekakuan, dengan  $R = 8,5$ . Pada kondisi  $T_n = T_g$ .

Variasi kekakuan, dengan  $R =$  berbobot. Pada kondisi  $T_n = T_g$ .

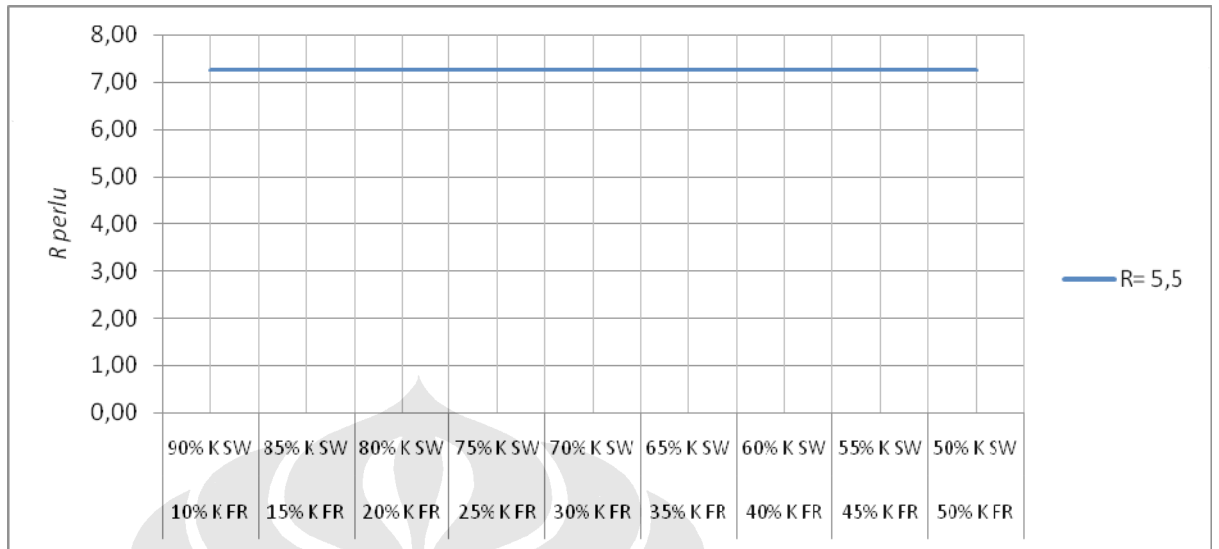
Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	1.84	1.84	5.70	5.70
15% $K_{total}$	85% $K_{total}$	1.86	1.86	5.81	5.81
20% $K_{total}$	80% $K_{total}$	1.89	1.89	5.92	5.92
25% $K_{total}$	75% $K_{total}$	1.91	1.91	6.03	6.03
30% $K_{total}$	70% $K_{total}$	1.91	1.91	6.15	6.15
35% $K_{total}$	65% $K_{total}$	1.93	1.93	6.28	6.28
40% $K_{total}$	60% $K_{total}$	1.98	1.98	6.40	6.40
45% $K_{total}$	55% $K_{total}$	2.04	2.04	6.54	6.54
50% $K_{total}$	50% $K_{total}$	2.10	2.10	6.68	6.68



**Gambar L.4** Variasi kekakuan, dengan  $R =$  berbobot. Pada kondisi  $T_n = T_g$ .

Variasi kekakuan, dengan  $R = 5,5$ . Pada kondisi  $T_n = 2T_g$ .

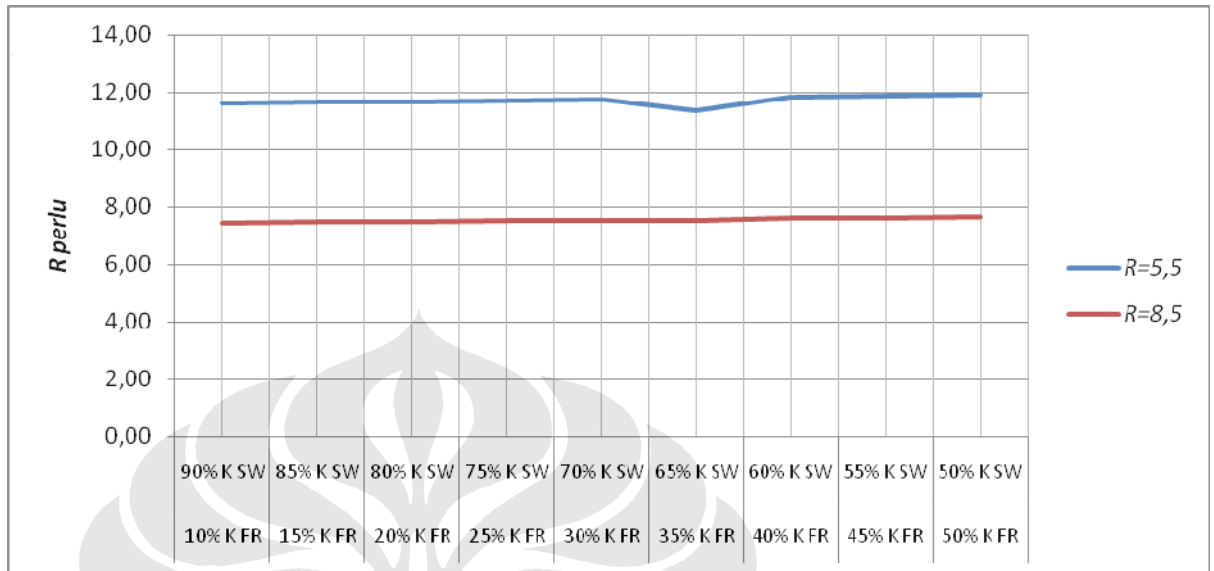
<b>Kekakuan</b>		<b>R perlu</b>		<b>R desain</b>	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	7.27	7.27	5.5	5.5
15% $K_{total}$	85% $K_{total}$	7.27	7.27	5.5	5.5
20% $K_{total}$	80% $K_{total}$	7.27	7.27	5.5	5.5
25% $K_{total}$	75% $K_{total}$	7.27	7.27	5.5	5.5
30% $K_{total}$	70% $K_{total}$	7.27	7.27	5.5	5.5
35% $K_{total}$	65% $K_{total}$	7.27	7.27	5.5	5.5
40% $K_{total}$	60% $K_{total}$	7.27	7.27	5.5	5.5
45% $K_{total}$	55% $K_{total}$	7.27	7.27	5.5	5.5
50% $K_{total}$	50% $K_{total}$	7.27	7.27	5.5	5.5



**Gambar L.5** Variasi kekakuan, dengan  $R = 5,5$ . Pada kondisi  $T_n = 2T_g$

Variasi kekakuan, dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ . Pada kondisi  $T_n = 2T_g$ .

Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	11.60	7.45	8.5	5.5
15% $K_{total}$	85% $K_{total}$	11.64	7.48	8.5	5.5
20% $K_{total}$	80% $K_{total}$	11.68	7.50	8.5	5.5
25% $K_{total}$	75% $K_{total}$	11.72	7.53	8.5	5.5
30% $K_{total}$	70% $K_{total}$	11.76	7.55	8.5	5.5
35% $K_{total}$	65% $K_{total}$	11.36	7.55	8.5	5.5
40% $K_{total}$	60% $K_{total}$	11.83	7.60	8.5	5.5
45% $K_{total}$	55% $K_{total}$	11.87	7.62	8.5	5.5
50% $K_{total}$	50% $K_{total}$	11.91	7.65	8.5	5.5



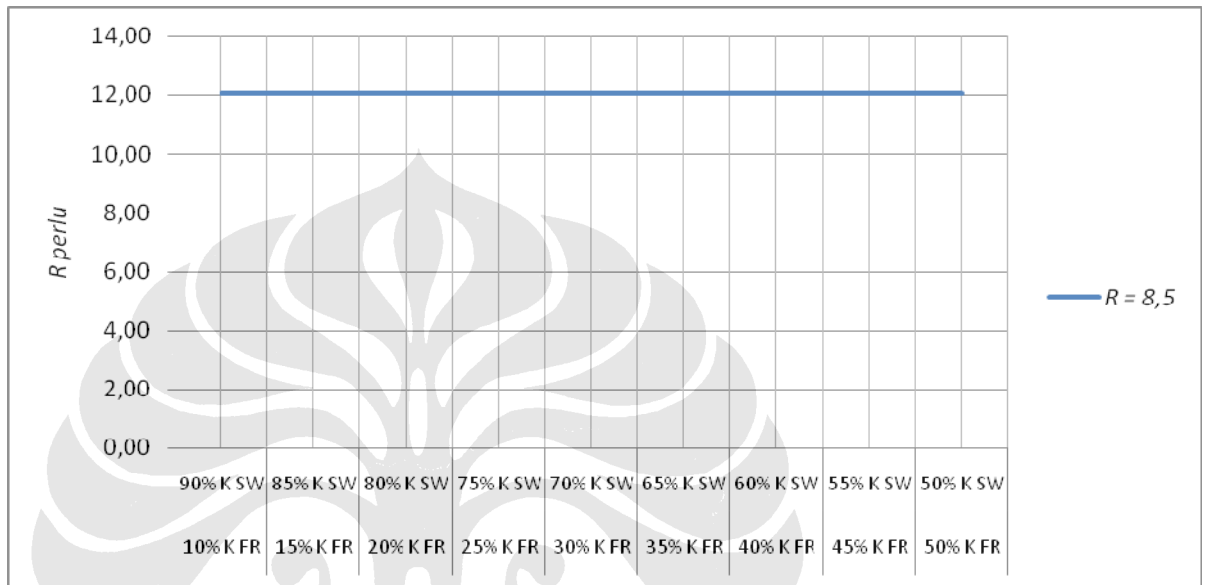
**Gambar L.6** Variasi kekakuan, dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ . Pada kondisi  $T_n = 2T_g$ .

Variasi kekakuan, dengan  $R = 8,5$ . Pada kondisi  $T_n = T_g$ .

Kekakuan		R perlu		R desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	12.05	12.05	8.5	8.5
15% $K_{total}$	85% $K_{total}$	12.05	12.05	8.5	8.5
20% $K_{total}$	80% $K_{total}$	12.05	12.05	8.5	8.5
25% $K_{total}$	75% $K_{total}$	12.05	12.05	8.5	8.5
30% $K_{total}$	70% $K_{total}$	12.05	12.05	8.5	8.5
35% $K_{total}$	65% $K_{total}$	12.05	12.05	8.5	8.5



40% $K_{total}$	60% $K_{total}$	12.05	12.05	8.5	8.5
45% $K_{total}$	55% $K_{total}$	12.05	12.05	8.5	8.5
50% $K_{total}$	50% $K_{total}$	12.05	12.05	8.5	8.5

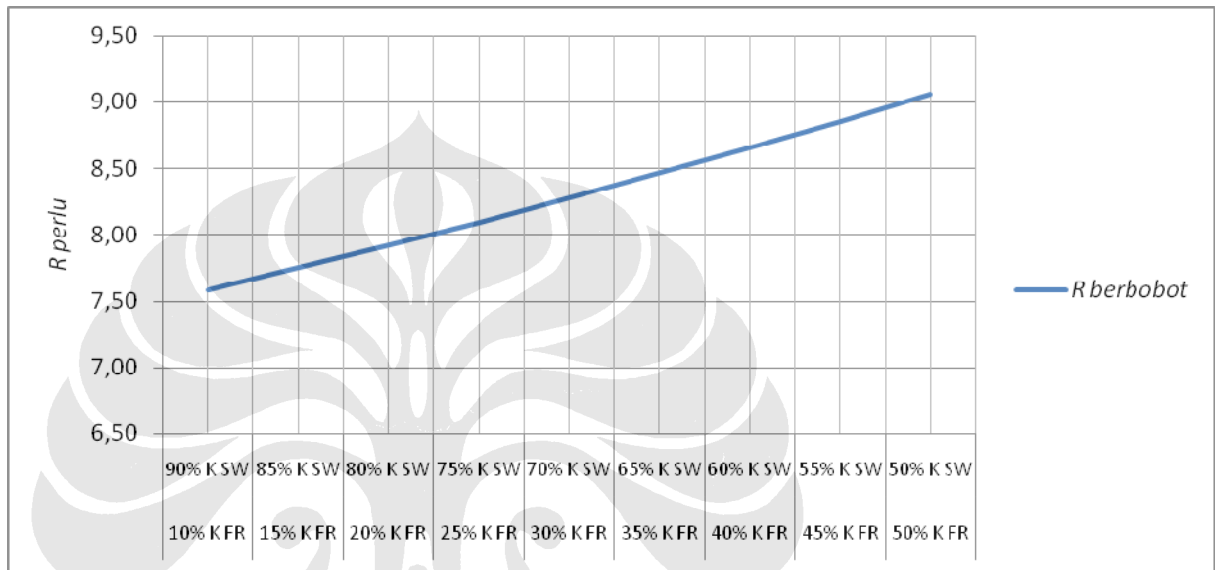


**Gambar L.7** Variasi kekakuan, dengan  $R = 8,5$ . Pada kondisi  $T_n = T_g$

Variasi kekakuan, dengan  $R$  berbobot. Pada kondisi  $T_n = 2T_g$ .

Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	7.59	7.59	5.70	5.70
15% $K_{total}$	85% $K_{total}$	7.75	7.75	5.81	5.81
20% $K_{total}$	80% $K_{total}$	7.92	7.92	5.92	5.92
25% $K_{total}$	75% $K_{total}$	8.10	8.10	6.03	6.03

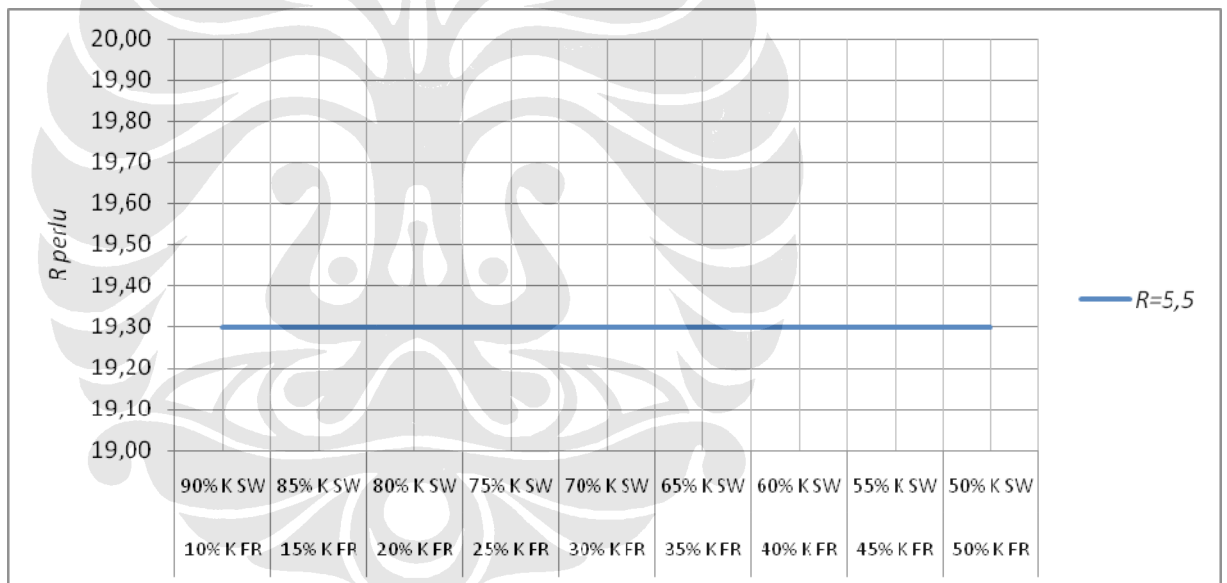
30% $K_{total}$	70% $K_{total}$	8.28	8.28	6.15	6.15
35% $K_{total}$	65% $K_{total}$	8.47	8.47	6.28	6.28
40% $K_{total}$	60% $K_{total}$	8.66	8.66	6.40	6.40
45% $K_{total}$	55% $K_{total}$	8.86	8.86	6.54	6.54
50% $K_{total}$	50% $K_{total}$	9.06	9.06	6.68	6.68



**Gambar L.8** Variasi kekakuan, dengan  $R$  berbobot. Pada kondisi  $T_n = 2T_g$ .

Variasi kekakuan, dengan  $R = 5,5$ . Pada kondisi  $T_n = \frac{1}{2}T_g$ .

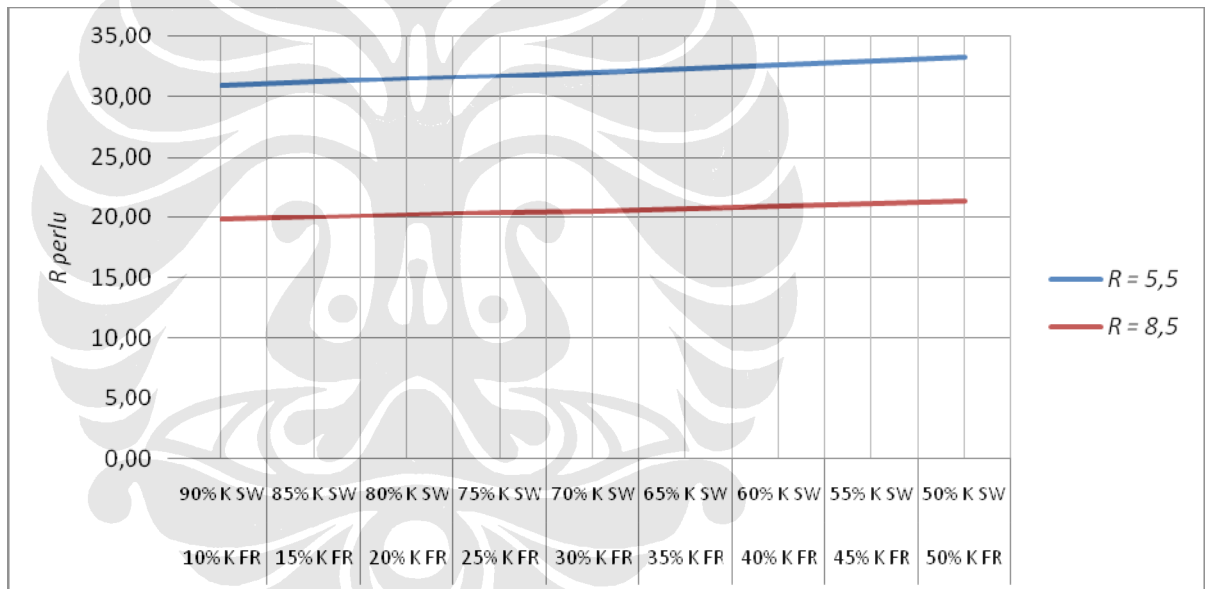
Kekakuan		R perlu		R desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	19.30	19.30	5.5	5.5
15% $K_{total}$	85% $K_{total}$	19.30	19.30	5.5	5.5
20% $K_{total}$	80% $K_{total}$	19.30	19.30	5.5	5.5
25% $K_{total}$	75% $K_{total}$	19.30	19.30	5.5	5.5
30% $K_{total}$	70% $K_{total}$	19.30	19.30	5.5	5.5
35% $K_{total}$	65% $K_{total}$	19.30	19.30	5.5	5.5
40% $K_{total}$	60% $K_{total}$	19.30	19.30	5.5	5.5
45% $K_{total}$	55% $K_{total}$	19.30	19.30	5.5	5.5
50% $K_{total}$	50% $K_{total}$	19.30	19.30	5.5	5.5



Gambar L.9 Variasi kekakuan, dengan  $R = 5,5$ . Pada kondisi  $T_n = \frac{1}{2}T_g$ .

Variasi kekakuan, dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ . Pada kondisi  $T_n = \frac{1}{2}T_g$ .

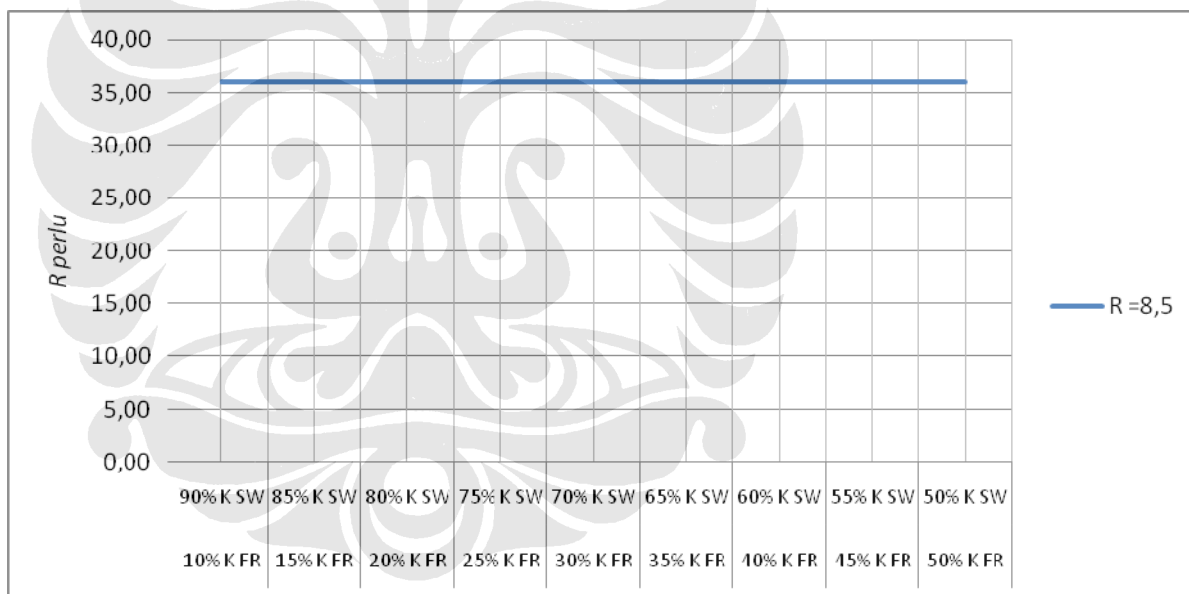
Kekakuan		R perlu		R desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	30.83	19.86	8.5	5.5
15% $K_{total}$	85% $K_{total}$	31.13	20.05	8.5	5.5
20% $K_{total}$	80% $K_{total}$	31.43	20.24	8.5	5.5
25% $K_{total}$	75% $K_{total}$	31.73	20.43	8.5	5.5
30% $K_{total}$	70% $K_{total}$	32.03	20.62	8.5	5.5
35% $K_{total}$	65% $K_{total}$	32.33	20.81	8.5	5.5
40% $K_{total}$	60% $K_{total}$	32.64	21.01	8.5	5.5
45% $K_{total}$	55% $K_{total}$	32.94	21.20	8.5	5.5
50% $K_{total}$	50% $K_{total}$	33.25	21.40	8.5	5.5



**Gambar L.10** Variasi kekakuan, dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ . Pada kondisi  $T_n = \frac{1}{2}T_g$ .

Variasi kekakuan, dengan  $R = 8,5$ . Pada kondisi  $T_n = \frac{1}{2}T_g$ .

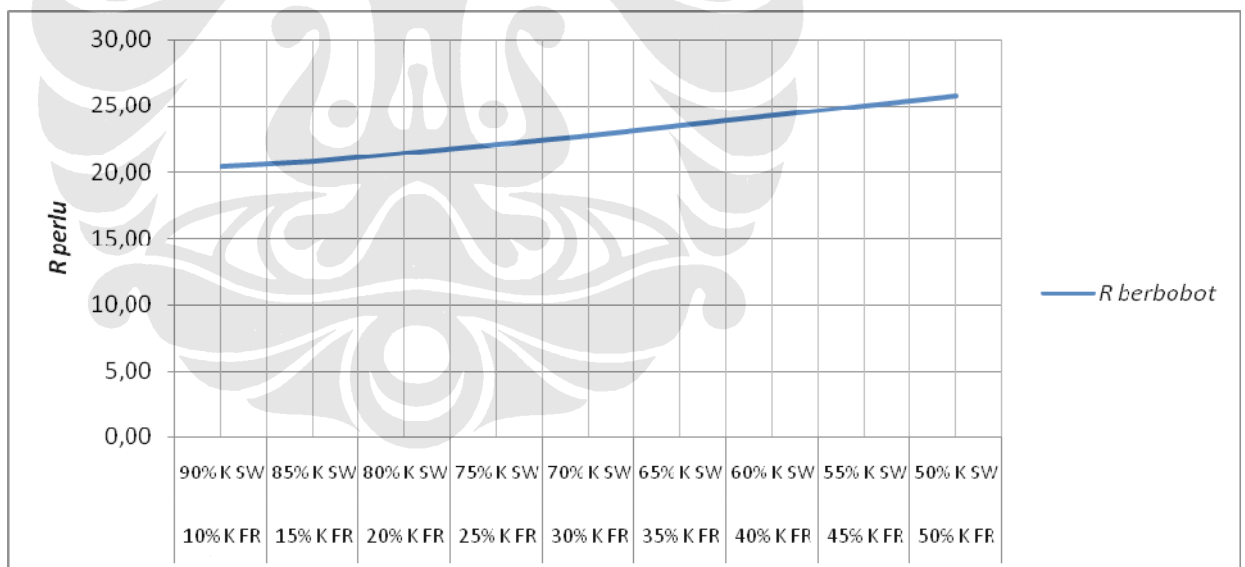
Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	36.02	36.02	8.5	8.5
15% $K_{total}$	85% $K_{total}$	36.02	36.02	8.5	8.5
20% $K_{total}$	80% $K_{total}$	36.02	36.02	8.5	8.5
25% $K_{total}$	75% $K_{total}$	36.02	36.02	8.5	8.5
30% $K_{total}$	70% $K_{total}$	36.02	36.02	8.5	8.5
35% $K_{total}$	65% $K_{total}$	36.02	36.02	8.5	8.5
40% $K_{total}$	60% $K_{total}$	36.02	36.02	8.5	8.5
45% $K_{total}$	55% $K_{total}$	36.02	36.02	8.5	8.5
50% $K_{total}$	50% $K_{total}$	36.02	36.02	8.5	8.5



**Gambar L.11** Variasi kekakuan, dengan  $R = 8,5$ . Pada kondisi  $T_n = \frac{1}{2}T_g$ .

Variasi kekakuan, dengan  $R$  berbobot. Pada kondisi  $T_n = \frac{1}{2}T_g$ .

Kekakuan		$R$ perlu		$R$ desain	
$K_{FR}$	$K_{SW}$	$R^*_{FR}$	$K_{FR}$	$K_{SW}$	$R^*_{FR}$
10% $K_{total}$	90% $K_{total}$	20.46	20.46	5.70	5.70
15% $K_{total}$	85% $K_{total}$	20.86	20.86	5.81	5.81
20% $K_{total}$	80% $K_{total}$	21.49	21.49	5.92	5.92
25% $K_{total}$	75% $K_{total}$	22.14	22.14	6.03	6.03
30% $K_{total}$	70% $K_{total}$	22.81	22.81	6.15	6.15
35% $K_{total}$	65% $K_{total}$	23.51	23.51	6.28	6.28
40% $K_{total}$	60% $K_{total}$	24.24	24.24	6.40	6.40
45% $K_{total}$	55% $K_{total}$	25.00	25.00	6.54	6.54
50% $K_{total}$	50% $K_{total}$	25.78	25.78	6.68	6.68



**Gambar L.12** Variasi kekakuan, dengan  $R$  berbobot. Pada kondisi  $T_n = \frac{1}{2}T_g$

## **LAMPIRAN B**

### **SIMULASI 2**

#### **Variasi Periode Getar Gempa**

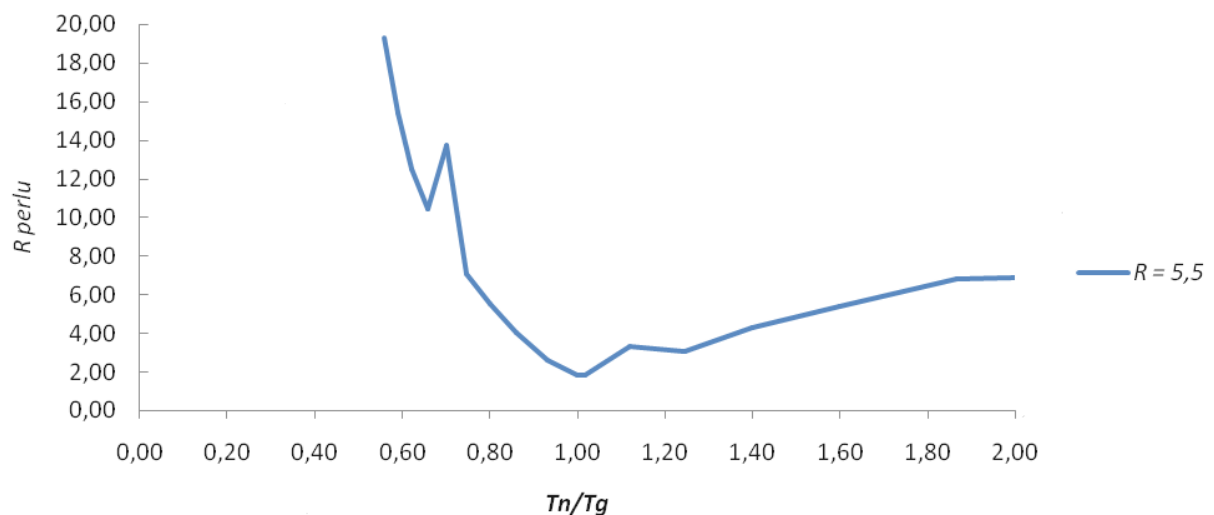


LAMPIRAN B - 1

## LAMPIRAN B. LA VARIASI PRIODE GEMPA ( $T_G$ )

Dengan  $R = 5,5$ .  $K_{FR} = 30\% K_{total}$  dan  $K_{SW} = 70\% K_{total}$

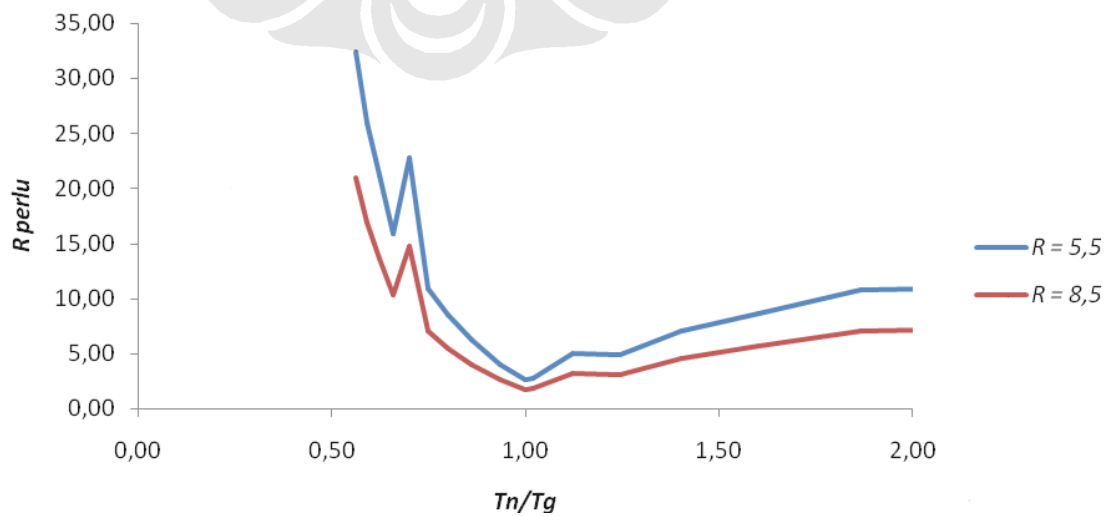
Tn/Tg	Tg	Fr		Sw	
		R Perlu	R Disain	R Perlu	R Disain
0.56	2	19.31	5.5	19.31	5.5
0.59	1.9	15.41	5.5	15.41	5.5
0.62	1.8	12.50	5.5	12.50	5.5
0.66	1.7	10.45	5.5	10.45	5.5
0.70	1.6	13.73	5.5	13.73	5.5
0.75	1.5	7.08	5.5	7.08	5.5
0.80	1.4	5.51	5.5	5.51	5.5
0.86	1.3	4.00	5.5	4.00	5.5
0.93	1.2	2.59	5.5	2.59	5.5
1.00	1.1197	1.82	5.5	1.82	5.5
1.02	1.1	1.85	5.5	1.85	5.5
1.12	1	3.30	5.5	3.30	5.5
1.24	0.9	3.07	5.5	3.07	5.5
1.40	0.8	4.31	5.5	4.31	5.5
1.60	0.7	5.39	5.5	5.39	5.5
1.87	0.6	6.82	5.5	6.82	5.5
2.24	0.5	6.99	5.5	6.99	5.5
2.80	0.4	6.45	5.5	6.45	5.5
3.73	0.3	6.02	5.5	6.02	5.5
5.60	0.2	5.01	5.5	5.01	5.5
11.20	0.1	2.66	5.5	2.66	5.5





Dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 5,5$ .  $K_{FR} = 30\% K_{total}$  dan  $K_{SW} = 70\% K_{total}$

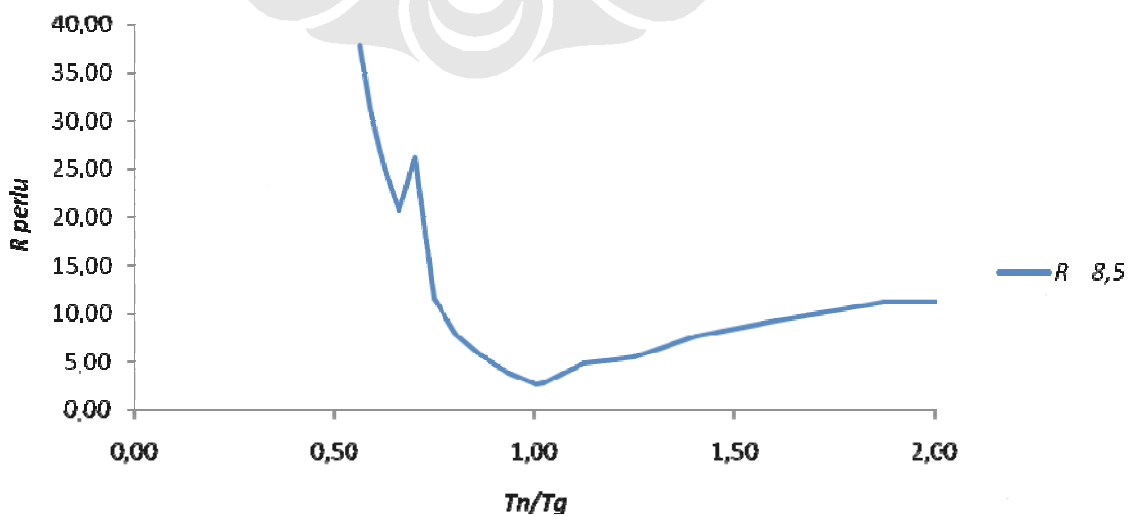
Tn/Tg	Tg	Fr		Sw	
		R Perlu	R Disain	R Perlu	R Disain
0.56	2	32.43	8.5	20.93	5.5
0.59	1.9	25.97	8.5	16.92	5.5
0.62	1.8	21.19	8.5	13.66	5.5
0.66	1.7	15.85	8.5	10.32	5.5
0.70	1.6	22.83	8.5	14.79	5.5
0.75	1.5	10.87	8.5	7.07	5.5
0.80	1.4	8.47	8.5	5.51	5.5
0.86	1.3	6.22	8.5	4.03	5.5
0.93	1.2	4.00	8.5	2.60	5.5
1.00	1.1197	2.68	8.5	1.75	5.5
1.02	1.1	2.73	8.5	1.78	5.5
1.12	1	4.97	8.5	3.24	5.5
1.24	0.9	4.85	8.5	3.14	5.5
1.40	0.8	7.02	8.5	4.54	5.5
1.60	0.7	8.64	8.5	5.64	5.5
1.87	0.6	10.83	8.5	7.09	5.5
2.24	0.5	10.98	8.5	7.25	5.5
2.80	0.4	10.40	8.5	6.69	5.5
3.73	0.3	9.58	8.5	6.25	5.5
5.60	0.2	7.80	8.5	5.24	5.5
11.20	0.1	4.35	8.5	4.35	5.5



LAMPIRAN B - 3

Dengan  $R = 8,5$ .  $K_{FR} = 30\% K_{total}$  dan  $K_{SW} = 70\% K_{total}$

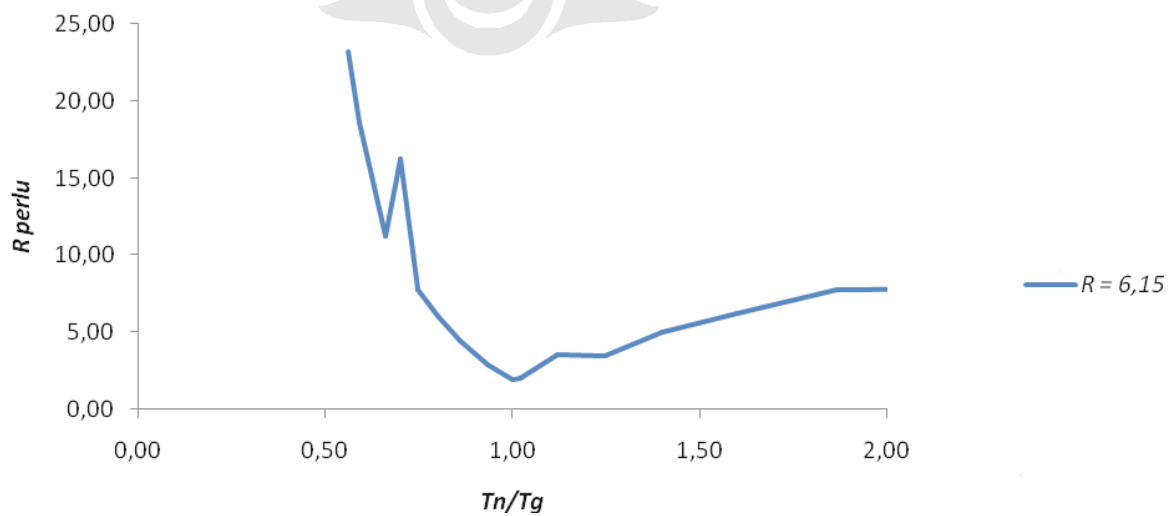
Tn/Tg	Tg	Fr		Sw	
		R Perlu	R Disain	R Perlu	R Disain
0.56	2	37.76	8.5	37.76	8.5
0.59	1.9	30.58	8.5	30.58	8.5
0.62	1.8	25.19	8.5	25.19	8.5
0.66	1.7	20.67	8.5	20.67	8.5
0.70	1.6	26.20	8.5	26.20	8.5
0.75	1.5	11.56	8.5	11.56	8.5
0.80	1.4	7.83	8.5	7.83	8.5
0.86	1.3	5.70	8.5	5.70	8.5
0.93	1.2	3.78	8.5	3.78	8.5
1.00	1.1197	2.61	8.5	2.61	8.5
1.02	1.1	2.73	8.5	2.73	8.5
1.12	1	4.79	8.5	4.79	8.5
1.24	0.9	5.48	8.5	5.48	8.5
1.40	0.8	7.67	8.5	7.67	8.5
1.60	0.7	9.18	8.5	9.18	8.5
1.87	0.6	11.20	8.5	11.20	8.5
2.24	0.5	11.15	8.5	11.15	8.5
2.80	0.4	10.40	8.5	10.40	8.5
3.73	0.3	9.42	8.5	9.42	8.5
5.60	0.2	7.51	8.5	7.51	8.5
11.20	0.1	4.07	8.5	4.07	8.5



LAMPIRAN B - 4

Dengan  $R$  berbobot.  $K_{FR} = 30\% K_{total}$  dan  $K_{SW} = 70\% K_{total}$

Tn/Tg	Tg	Fr		Sw	
		R Perlu	R Disain	R Perlu	R Disain
0.56	2	23.23	6.15	23.23	6.15
0.59	1.9	18.57	6.15	18.57	6.15
0.62	1.8	15.08	6.15	15.08	6.15
0.66	1.7	11.25	6.15	11.25	6.15
0.70	1.6	16.25	6.15	16.25	6.15
0.75	1.5	7.72	6.15	7.72	6.15
0.80	1.4	6.02	6.15	6.02	6.15
0.86	1.3	4.43	6.15	4.43	6.15
0.93	1.2	2.88	6.15	2.88	6.15
1.00	1.1197	1.91	6.15	1.91	6.15
1.02	1.1	2.04	6.15	2.04	6.15
1.12	1	3.54	6.15	3.54	6.15
1.24	0.9	3.46	6.15	3.46	6.15
1.40	0.8	5.00	6.15	5.00	6.15
1.60	0.7	6.19	6.15	6.19	6.15
1.87	0.6	7.71	6.15	7.71	6.15
2.24	0.5	7.86	6.15	7.86	6.15
2.80	0.4	7.18	6.15	7.18	6.15
3.73	0.3	6.64	6.15	6.64	6.15
5.60	0.2	5.45	6.15	5.45	6.15
11.20	0.1	2.97	6.15	2.97	6.15

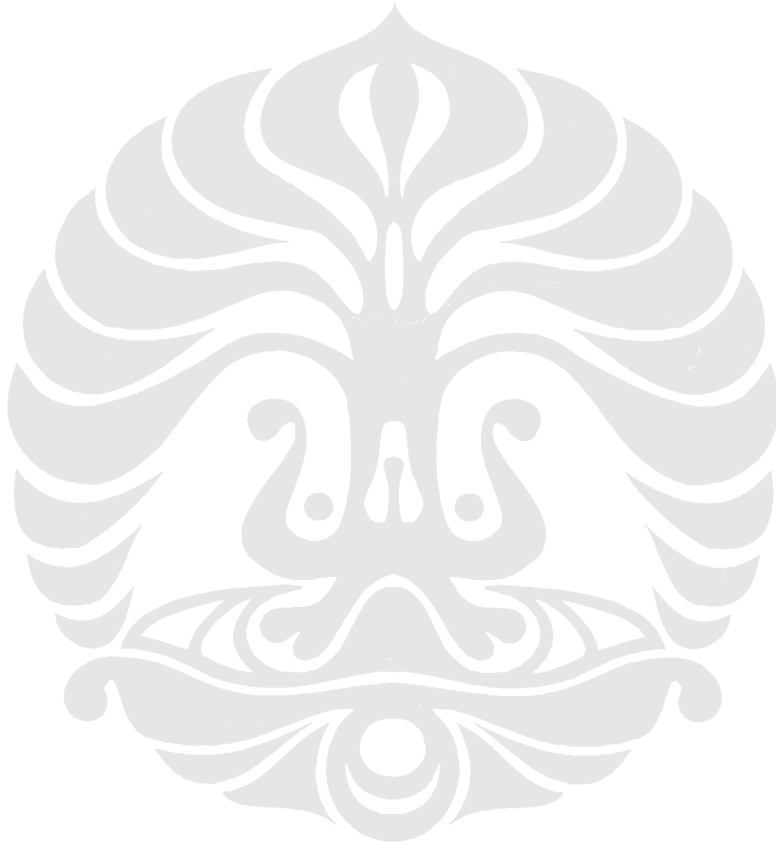


LAMPIRAN B - 5

## **LAMPIRAN C**

### **SIMULASI 3**

#### **Variasi Percepatan Gempa**



LAMPIRAN C - 1

## LAMPIRAN C. VARIASI PERCEPATAN GEMPA

$T_n/T_g = 1$ ;  $K_{FR} = 30\% K_{total}$  dan  $K_{SW} = 70\% K_{total}$

$T_n/T_g = 2$ ;  $K_{FR} = 30\% K_{total}$  dan  $K_{SW} = 70\% K_{total}$

$\alpha$	R perlu		R desain	
	R*FR	R*SW	R FR	R SW
0.2g	1.82	1.82	5.5	5.5
	2.68	1.75	8.5	5.5
	2.29	2.29	8.5	8.5
	1.91	1.91	6.15	6.15
0.25g	1.82	1.82	5.5	5.5
	2.68	1.75	8.5	5.5
	2.29	2.29	8.5	8.5
	1.91	1.91	6.15	6.15
0.3g	1.82	1.82	5.5	5.5
	2.68	1.75	8.5	5.5
	2.29	2.29	8.5	8.5
	1.91	1.91	6.15	6.15
0.35g	1.82	1.82	5.5	5.5
	2.68	1.75	8.5	5.5
	2.29	2.29	8.5	8.5
	1.91	1.91	6.15	6.15
0.4g	1.82	1.82	5.5	5.5
	2.68	1.75	8.5	5.5
	2.29	2.29	8.5	8.5
	1.91	1.91	6.15	6.15

$\alpha$	R perlu		R desain	
	R*FR	R*SW	R FR	R SW
0.2g	7.27	7.27	5.5	5.5
	11.76	7.55	8.5	5.5
	12.05	12.05	8.5	8.5
	8.28	8.28	6.15	6.15
0.25g	7.27	7.27	5.5	5.5
	11.76	7.55	8.5	5.5
	12.05	12.05	8.5	8.5
	8.28	8.28	6.15	6.15
0.3g	7.27	7.27	5.5	5.5
	11.76	7.55	8.5	5.5
	12.05	12.05	8.5	8.5
	8.28	8.28	6.15	6.15
0.35g	7.27	7.27	5.5	5.5
	11.76	7.55	8.5	5.5
	12.05	12.05	8.5	8.5
	8.28	8.28	6.15	6.15
0.4g	7.27	7.27	5.5	5.5
	11.76	7.55	8.5	5.5
	12.05	12.05	8.5	8.5
	8.28	8.28	6.15	6.15

$T_n/T_g = 1/2$  ;  $K_{FR}=30\% K_{total}$  dan  $K_{SW}=70\% K_{total}$

$\alpha$	R perlu		R desain	
	R*FR	R*SW	R FR	R SW
0.2g	19.30	19.30	5.5	5.5
	32.03	20.62	8.5	5.5
	36.02	36.02	8.5	8.5
	22.81	22.81	6.15	6.15
0.25g	19.30	19.30	5.5	5.5
	32.03	20.62	8.5	5.5
	36.02	36.02	8.5	8.5
	22.81	22.81	6.15	6.15
0.3g	19.30	19.30	5.5	5.5
	32.03	20.62	8.5	5.5
	36.02	36.02	8.5	8.5
	22.81	22.81	6.15	6.15
0.35g	19.30	19.30	5.5	5.5
	32.03	20.62	8.5	5.5
	36.02	36.02	8.5	8.5
	22.81	22.81	6.15	6.15
0.4g	19.30	19.30	5.5	5.5
	32.03	20.62	8.5	5.5
	36.02	36.02	8.5	8.5
	22.81	22.81	6.15	6.15

LAMPIRAN C - 3

## LAMPIRAN D

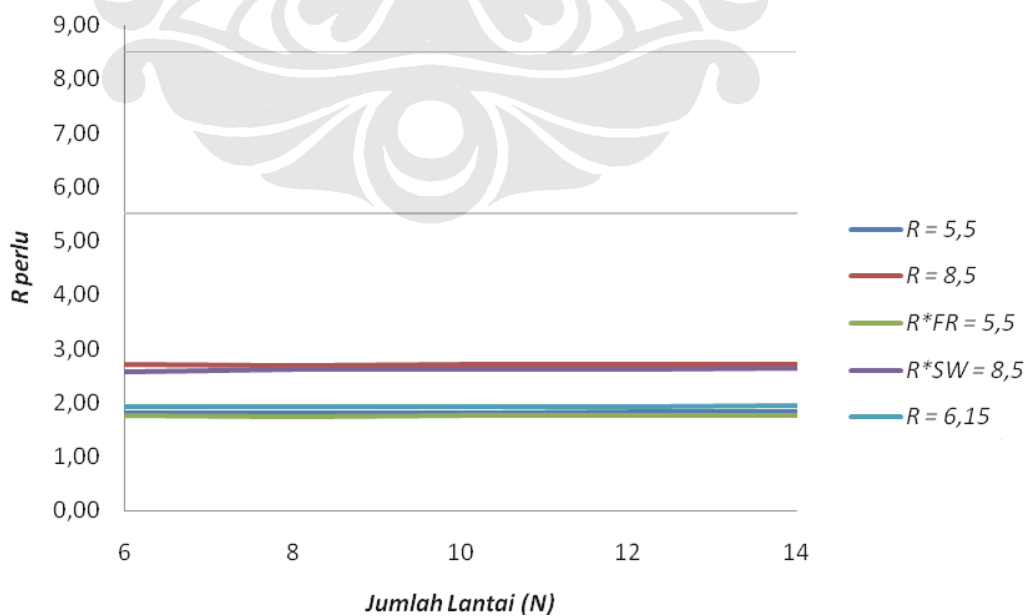
### SIMULASI 4



LAMPIRAN D - 1

## LAMPIRAN D.VARIASI JUMLAH LANTAI

Jumlah Lantai	R FR		R SW	
	R*FR	R	R*SW	R
6	1.81	5.5	1.81	5.5
	2.70	8.5	1.76	5.5
	2.58	8.5	2.58	8.5
	1.91	6.15	1.91	6.15
8	1.82	5.5	1.82	5.5
	2.68	8.5	1.75	5.5
	2.61	8.5	2.61	8.5
	1.91	6.15	1.91	6.15
10	1.81	5.5	1.81	5.5
	2.71	8.5	1.75	5.5
	2.63	8.5	2.63	8.5
	1.93	6.15	1.93	6.15
12	1.82	5.5	1.82	5.5
	2.71	8.5	1.76	5.5
	2.62	8.5	2.62	8.5
	1.93	6.15	1.93	6.15
14	1.83	5.5	1.83	5.5
	2.72	8.5	1.76	5.5
	2.65	8.5	2.65	8.5
	1.94	6.15	1.94	6.15



LAMPIRAN D - 2



## **LAMPIRAN E**

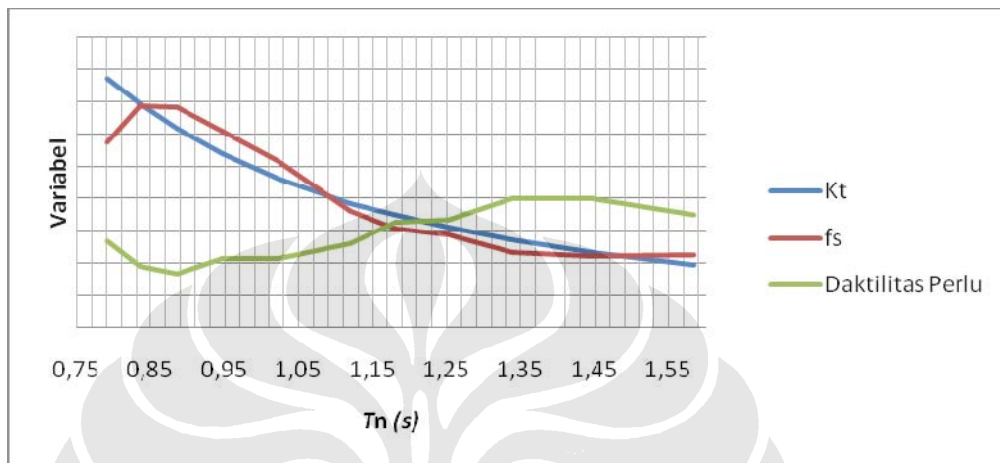
### **SIMULASI 5**

**Variasi Dengan Menggunakan Gempa El Centro**



LAMPIRAN F- 1

## LAMPIRAN E. VARIASI DENGAN MENGGUNAKAN GEMPA EL CENTRO



Dengan  $R_{FR} = 5,5$  dan  $R_{SW} = 5,5$ . 30%  $K_{FR}$  dan 70%  $K_{SW}$

Tn	R*FR	R*SW	R FR	R SW
1.58	4.04	4.04	5,5	5,5
1.45	6.43	6.43	5,5	5,5
1.34	6.83	6.83	5,5	5,5
1.25	5.36	5.36	5,5	5,5
1.18	5.36	5.36	5,5	5,5
1.12	4.30	4.30	5,5	5,5
1.02	3.97	3.97	5,5	5,5
0.95	3.11	3.11	5,5	5,5
0.89	2.96	2.96	5,5	5,5
0.83	3.15	3.15	5,5	5,5
0.79	4.56	4.56	5,5	5,5

Dengan  $R_{FR} = 8,5$  dan  $R_{SW} =$

Tn	R*FR	R*SW	R FR	R SW
1.58	9.58	6.30	8,5	5,5
1.45	11.35	7.37	8,5	5,5
1.34	10.82	6.94	8,5	5,5
1.25	9.05	6.01	8,5	5,5
1.18	9.31	5.92	8,5	5,5
1.12	7.65	4.94	8,5	5,5
1.02	5.78	3.91	8,5	5,5
0.95	6.16	3.98	8,5	5,5
0.89	5.39	3.41	8,5	5,5
0.83	5.10	3.28	8,5	5,5
0.79	7.53	5.02	8,5	5,5

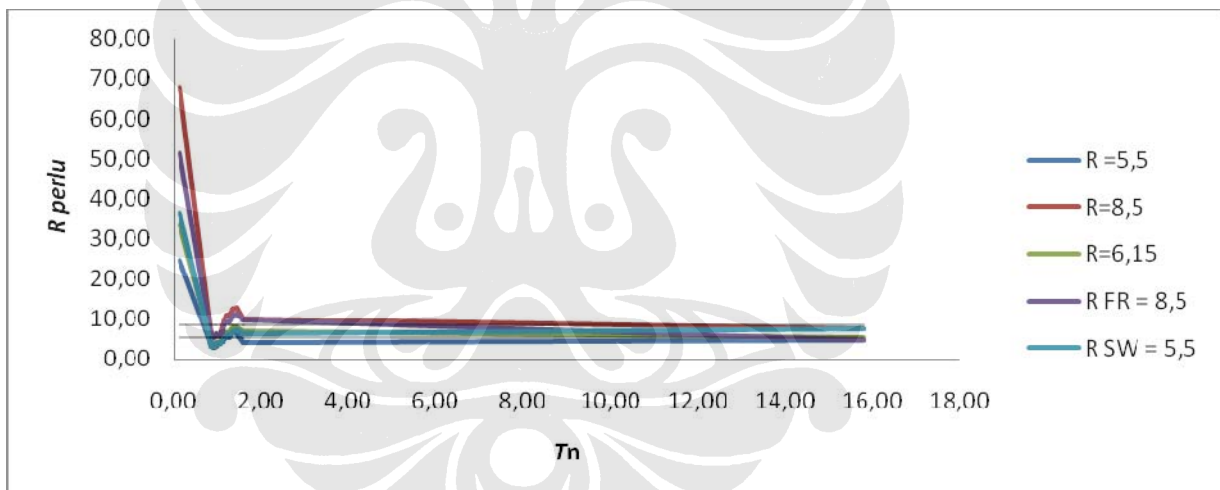
LAMPIRAN F- 2

Dengan  $R_{FR} = 8,5$  dan  $R_{SW} = 8,5$ . 30%  $K_{FR}$  dan 70%  $K_{SW}$   
 6,15. 30%  $K_{FR}$  dan 70%  $K_{SW}$

Dengan  $R_{FR} = 6,15$  dan  $R_{SW} =$

Tn	R*FR	R*SW	R FR	R SW
1.58	10.00	10.00	8,5	8,5
1.45	12.79	12.79	8,5	8,5
1.34	12.50	12.50	8,5	8,5
1.25	10.87	10.87	8,5	8,5
1.18	10.90	10.90	8,5	8,5
1.12	9.50	9.50	8,5	8,5
1.02	6.12	6.12	8,5	8,5
0.95	5.77	5.77	8,5	8,5
0.89	5.63	5.63	8,5	8,5
0.83	6.17	6.17	8,5	8,5
0.79	8.53	8.53	8,5	8,5

Tn	R*FR	R*SW	R FR	R SW
1.58	6.97	6.97	6.15	6.15
1.45	8.00	8.00	6.15	6.15
1.34	8.02	8.02	6.15	6.15
1.25	6.70	6.70	6.15	6.15
1.18	6.56	6.56	6.15	6.15
1.12	5.22	5.22	6.15	6.15
1.02	4.32	4.32	6.15	6.15
0.95	4.25	4.25	6.15	6.15
0.89	3.32	3.32	6.15	6.15
0.83	3.82	3.82	6.15	6.15
0.79	5.40	5.40	6.15	6.15



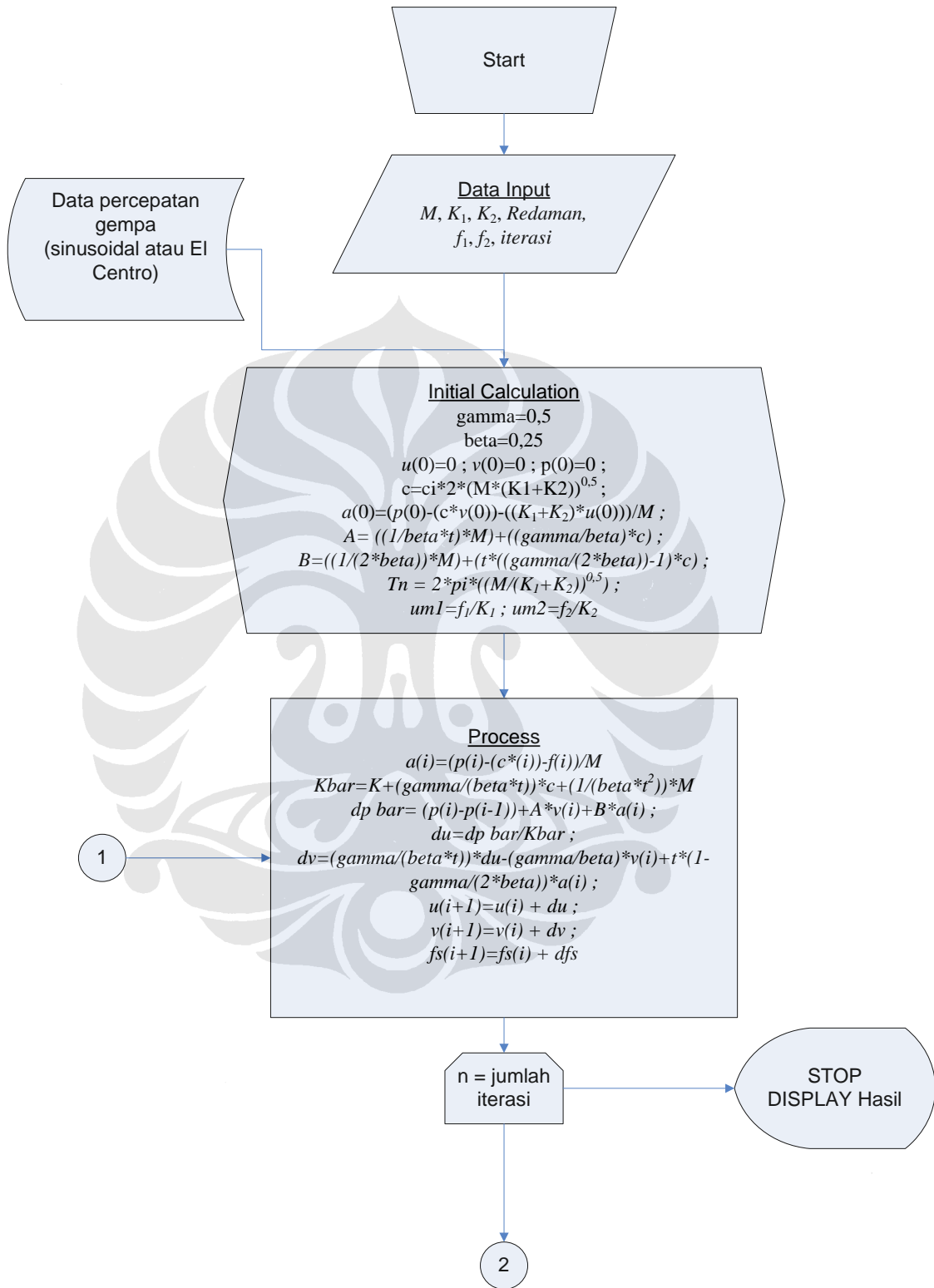
LAMPIRAN F- 3

**LAMPIRAN F**  
**DIAGRAM ALUR PROGRAM**

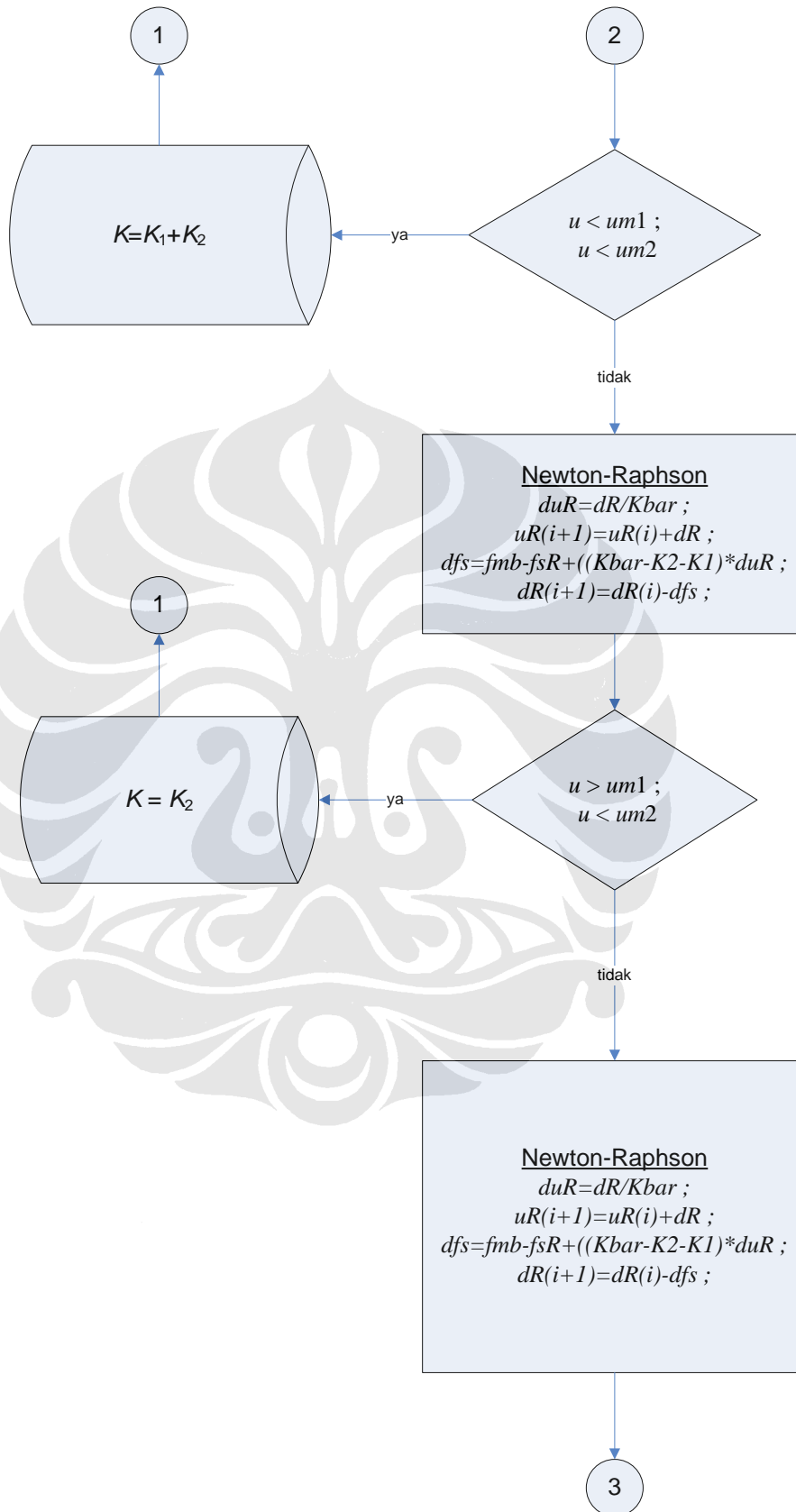


LAMPIRAN F- 1

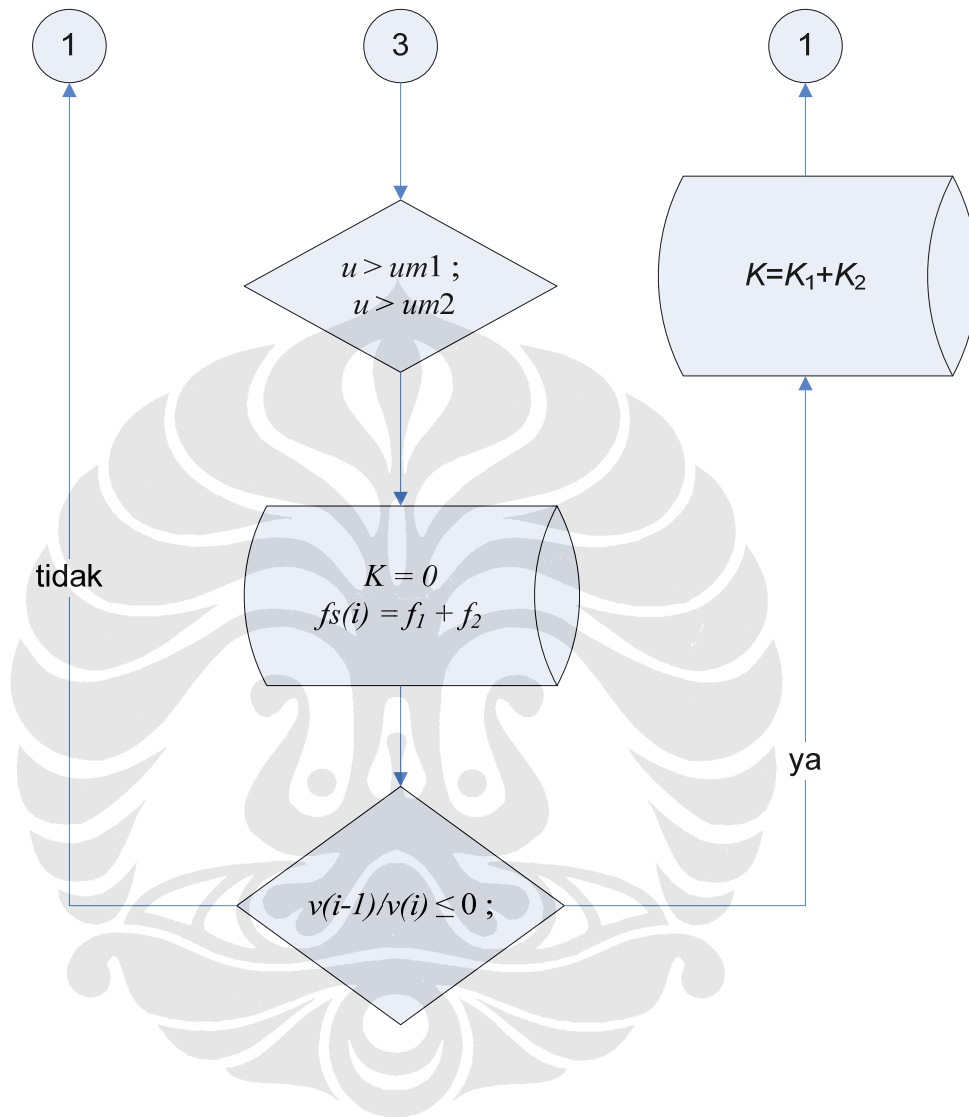
## LAMPIRAN F. DIAGRAM ALUR PROGRAM



LAMPIRAN F- 2



LAMPIRAN F- 3



LAMPIRAN F- 4

**LAMPIRAN G**  
**PROGRAM MATLAB**



LAMPIRAN F- 1



## LAMPIRAN G. PROGRAM MATLAB

```
clc;
% program ini untuk Struktur Gabungan.
disp('Newmarks Method Program Nonlinear Stuktur Gabungan');
disp('Dengan Newton Raphson');
M=input('Massa M =');
Kix1=input('Stiffnes Ki frame =');
Kix2=input('Stiffnes Ki shearwall =');
Ci=input('Dumping Redaman % =');
t=input('Time Iteration, delta t=');
fm1=input('Tegangan Leleh frame =');
fm2=input('Tegangan Leleh shearwall =');
disp('-----Initial Calculations-----')
%initial calculation
hold all
gamma=.5;
beta=.25;
u0 = 0; %lendutan awal
v0 = 0; %kecepatan awal
p0 = fungsi(0,0); %gaya awal
C = Ci*2*((M*(Kix1+Kix2))^0.5); %redaman C
a0 = (p0-(C*v0)-((Kix1+Kix2)*u0))/M; %percepatan awal
A = ((1/(beta*t))*M)+((gamma/beta)*C);
B = ((1/(2*beta))*M)+t*((gamma/(2*beta))-1)*C;
tn = 2*pi*((M/(Kix1+Kix2))^0.5); %priode natural

umx1=fm1/Kix1;
umx2=fm2/Kix2;

disp(['gamma = ' num2str(gamma)])
disp(['beta = ' num2str(beta)])
disp(['redaman C = ' num2str(C)])
disp(['A = ' num2str(A)])
disp(['B = ' num2str(B)])
disp(['deformasi leleh frame = ' num2str(umx1)])
disp(['deformasi leleh shearwall = ' num2str(umx2)])
disp(['tn = ' num2str(tn)])

%==== decesion ====
if umx1<umx2
    um1=umx1;
    um2=umx2;
    Kil=Kix1;
    Ki2=Kix2;
else
    um1=umx2;
    um2=umx1;
    Kil=Kix2;
    Ki2=Kix1;
end
fxx=(Kil+Ki2)*um1;
%=====
N_disarankan=tn/t
```

LAMPIRAN F- 2

```

%N=input('Jumlah iterasi =');
N=30000

fs0=0;
BU=0;
BU = zeros(N,1);

u = zeros(N,1);
v = zeros(N,1);
a = zeros(N,1);

fs = zeros(N,1);
E = zeros(N,1);
Kekakuan = zeros(N,1);
waktu = zeros(N,1);
% Loop over load steps
for i=1:(N)
    if BU(i)<uml & BU(i)>-uml
        K=Ki1+Ki2;
    else
%===== NEWTON RAPHSON METHOD 1 =====
        if Kix2 ~= 0 & BU(i-1)<uml & BU(i-1)>-uml
            %disp('Newton Raphson')
            uR=u(i-1);
            dR=dPbar;
            fsR=fs(i-1);
            duR=1;
            dut=0;
            if fs(i)>= 0
                fmb=fxx;
            else
                fmb=-fxx;
            end
            while duR>=.00001
                duR=dR/Kbar;
                uR=uR+duR;
                dfs=fmb-fsR+((Kbar-Ki2-Ki1)*duR);
                fsR=fmb;
                dR=dR-dfs;
                dut=duR+dut;
            end
            if fs(i)>= 0
                fs(i)=fxx;
            else
                fs(i)=-fxx;
            end
            u(i)=u(i-1)+dut;
            BU(i)=BU(i-1)+dut;
            dvt = (gamma/(beta*t))*dut - (gamma/beta)*v(i-1) + ...
                t*(1-gamma/(2*beta))*a(i-1);
            dat = (1/(beta*t^2))*dut - (1/(beta*t))*v(i-1) - ...
                (1/(2*beta))*a(i-1);
            v(i) = v(i-1) + dvt;
            a(i) = a(i-1) + dat;
            K=Ki2;
        end
    end
end

```

#### LAMPIRAN F- 3

```

%===== END NEWTON RAPHSON METHOD 1 =====
else
    if BU(i)<um2 & BU(i)>-um2
        K=Ki2;
        if Kix2 ~= 0 & (fs(i)/fs(i-1))<1
            K=Kil+Ki2;
            BU(i)=100;
            if (fs(i-1)/fs(i))<0
                BU(i)=0;
            end
        end
    end
else
    if (fs(i)/fs(i-1))<1
        K=Kil+Ki2;
        BU(i)=100;
        if (fs(i-1)/fs(i))<0
            BU(i)=0;
        end
    else
        K=0;
%===== NEWTON RAPHSON METHOD 2 =====
        if BU(i-1)<um2 & BU(i-1)>-um2
            %disp('Newton Raphson')
            uR=u(i-1);
            dR=dPbar;
            fsR=fs(i-1);
            duR=1;
            dut=0;
            if fs(i)>= 0
                fmb=fm2+fm1;
            else
                fmb=-fm2-fm1;
            end
            while duR>=.00001
                duR=dR/Kbar;
                uR=uR+duR;
                dfs=fmb-fsR+((Kbar-Ki2)*duR);
                fsR=fmb;
                dR=dR-dfs;
                dut=duR+dut;
            end
            if fs(i)>= 0
                fs(i)=fm2+fm1;
            else
                fs(i)=-fm2-fm1;
            end
            u(i)=u(i-1)+dut;
            BU(i)=BU(i-1)+dut;
            dvt = (gamma/(beta*t))*dut - (gamma/beta)*v(i-1) +
...
                t*(1-gamma/(2*beta))*a(i-1);
            dat = (1/(beta*t^2))*dut - (1/(beta*t))*v(i-1) -
...
                (1/(2*beta))*a(i-1);
            v(i) = v(i-1) + dvt;
            a(i) = a(i-1) + dat;
%===== END NEWTON RAPHSON METHOD 2 =====

```

#### LAMPIRAN F- 4

```

else
    if fs(i)>= 0
        fs(i)=fm2+fm1;
        if (v(i-1)/v(i))<=0
            K=Kil+Ki2;
        end
    else
        fs(i)=-fm2-fm1;
        if (v(i-1)/v(i))<=0
            K=Kil+Ki2;
        end
    end
end
end
end
end
end
end
end
a(i)=((fungsi(i-1,t))-(C*v(i))-fs(i))/M;
Kbar = K + (gamma/(beta*t)) * C + (1/(beta*t^2)) * M;
dP = fungsi(i,t)-fungsi(i-1,t);
dPbar = dP + A*v(i) + B*a(i);
du = dPbar/Kbar;
dv = (gamma/(beta*t))*du - (gamma/beta)*v(i) + ...
    t*(1-gamma/(2*beta))*a(i);
BU(i+1) = BU(i) + du;
u(i+1) = u(i) + du;
v(i+1) = v(i) + dv;
fs(i+1)=fs(i)+(K*du);
E(i)=fungsi(i-1,t);
waktu(i+1)=t*i;
Kekakuan(i+1)=K;
%disp('====='))
end
grid on
subplot(3,1,1)
plot(u,fs,'-b.') %untuk u vs fs
title('----- u vs fs -----')
xlabel('u')
ylabel('fs')
subplot(3,1,2)
plot(waktu,fs,'-r.') %untuk u vs t
title('----- waktu vs fs -----')
xlabel('waktu')
ylabel('fs')
subplot(3,1,3)
plot(waktu,u,'-m.')
title('----- waktu vs u -----')
xlabel('waktu')
ylabel('u')
disp('')
disp('          waktu          u          f          v          K')
sukses=horzcat(waktu, u, fs, v, Kekakuan)
format short g

```

LAMPIRAN F- 5