

# Kajian tahapan konstruksi jembatan Suramadu akibat gempa di Wilayah sekitar Selat Madura menggunakan analisis riwayat waktu yang dipengaruhi model elemen kabel = Study of construction stage of Suramadu bridge from earthquake effect around madura strait area using time history analysis influenced by cable element model

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## Abstrak

[<b>ABSTRAK</b><br>

Jembatan bentang panjang mempunyai perilaku kompleks apabila terkena gempa khususnya pada saat konstruksi sedang dilaksanakan. Pada penelitian ini, Jembatan Kabel Suramadu dipilih untuk menyajikan perilaku jembatan cable-stayed pada setiap tahapan konstruksi yang berjumlah 89 tahapan. Jembatan ditinjau pada 10 tahapan kritis yaitu tahapan ke-4, 9, 18, 27, 36, 45, 54, 63, 74, dan 89 (lengkap). Rekaman gempa terletak pada sepasang gempa arah memanjang struktur jembatan akan dikenai gempa timur ? barat (gempa transversal) dan arah melintang struktur jembatan akan dikenai gempa utara ? selatan (arah longitudinal) secara terpisah di sekitar Selat Madura yaitu Gempa Banyuwangi (23 Maret 2011), Gempa Jember (14 Februari 2011), dan Gempa Nusadua (18 Maret 2009). Analisis riwayat waktu dan respon spektrum menggunakan perbedaan ketiga elemen pada kabel yaitu elemen truss tension-only, cable linier (equivalent truss element), dan cable nonlinier (catenary cable element). Peninjauan nodal terletak pada pertemuan kabel-menara dan pertemuan kabel-gelagar sedangkan, peninjauan elemen terletak pada kiri dan kanan menara. Hasil penelitian menghasilkan kandungan frekuensi jembatan, periode alami struktur, respon perpindahan, gaya dalam aksial kabel, gaya dalam momen dan geser arah Z pada gelagar, dan tegangan normal kabel.

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<b>ABSTRACT</b><br>

Long-span bridge has a complex behavior when exposed to the earthquake, especially when the construction is being carried out. In this study, Suramadu Cable Bridge chosen to present the behavior of cable-stayed bridge at each stage of construction totaling 89 stages. Bridges are reviewed at ten critical stages. These stages are 4th, 9th, 18th, 27th, 36th, 45th, 54th, 63rd, 74th, and 89th stage (final stage). Recorded earthquake the located on longitudinal direction of the bridge structure will be east ? west earthquake (transverse earthquake) and the transverse direction of the bridge structure will be given north - south (longitudinal direction) earthquake separately around the Madura Strait those are Banyuwangi earthquake (March 23, 2011), Jember earthquake (February 14, 2011), and Nusadua earthquake (March 18, 2009). Time history and response spectrum analysis is done by using three different elements on the cable. Those are tension-only truss elements, linear cable (equivalent truss element), and the nonlinear cable (catenary cable element). The review of nodal located in joint tower-cable and joint cable-girder while the review of the element located on the left side and right side of the tower. The results of the study resulted in the bridge's frequency content, the natural period of the structure, the displacement response, axial force in the cable, moment and shear force in the Z direction on the girder, and the normal cable stress; Long-span bridge has a complex behavior when exposed to the earthquake, especially when the construction is being carried out. In

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