

SEISMIC ASSESSMENT OF AN OVERPASS BRIDGE ACCOUNTING FOR NON-LINEAR MATERIAL AND SOIL RESPONSE AND VARYING BOUNDARY CONDITIONS

Andreas J. Kappos¹, Petros Potikas², and Anastasios G. Sextos³

¹ Aristotle University of Thessaloniki
Department of Civil Engineering, Structural Engineering Division
e-mail: ajkap@civil.auth.gr

² Aristotle University of Thessaloniki
Department of Civil Engineering, Structural Engineering Division

³ Aristotle University of Thessaloniki
Department of Civil Engineering, Structural Engineering Division
e-mail: asextos@civil.auth.gr

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Abstract. *Seismic assessment of bridges using the popular ‘pushover’ (i.e. nonlinear static) analysis technique often ignores the effect of some sources of nonlinearity such as those associated with the foundation soil and the boundary conditions, that may significantly modify the overall performance of the structure and the estimated pushover curves. In this context, the seismic response of a typical overpass constructed along the 670km Egnatia highway in northern Greece is assessed herein using lumped plasticity models to account for the inelastic behaviour of the critical cross-sections of piers and piles, and non-linear springs to consider foundation-soil compliance. The results of the analysis show a markedly different seismic behaviour when the abutment – soil system is included in the analysis, rather than simply considering a pinned support (in the transverse direction) as usually done in previous studies. Furthermore, for stronger excitations, it is seen that as inelastic mechanisms (of piers, piles, pile caps, and soil) are introduced and different non-linear components (i.e. joint /gap closure) are activated, the assumptions made on the foundation and soil compliance play an increasingly important role that can potentially modify the anticipated failure hierarchy, as well as the ensuing pushover curves in both directions of the bridge.*