

# A Numerical Approach for Obtaining Fragility Curves in Seismic Structural Mechanics: A Bridge Case of Egnatia Motorway in Northern Greece

A. Liolios, S. Radev

Development of vulnerability relationships for Civil Engineering structures represents a critically important step in damage estimation process. Scope of the vulnerability analysis is the creation of the so-called fragility curves, through which the probability that a specific damage level will be exceeded for a given intensity of a seismic event may be quickly estimated, supporting significantly the decision-making procedures. In the present article, a simplified numerical methodology for the evaluation of vulnerability curves for bridges is presented. The methodology is based on the Finite Element Method and combines the nonlinear static pushover procedure and the capacity spectrum method [1]. The presented methodology is applied for establishing fragility curves for an existing reinforced concrete bridge in the Krystalopigi Psilorahi section of Egnatia Motorway, in the county of Epirus, Greece. Egnatia Odos is the Motorway that crosses northern Greece in an E-W direction. It is currently the largest and technically the most demanding highway project in Greece, and one of the biggest infrastructure ones under construction in Europe. Its main axis has a length of 670km and includes about 1900 structures (bridges and culverts). The bridge examined herein is structurally representative of hundred of bridges in Egnatia Motorway and in Greece more generally [2].

LITERATURE 1. Chopra, A.K.: Dynamics of Structures. Theory and Applications to Earthquake Engineering. Pearson Prentice Hall, New Jersey (2007). 2. AS-PROGE: Research Project for the ASeismic PROtection of Bridges. Egnatia Odos S.A., Thessaloniki, Greece (2007).