

## *Abstract*

Object of the present dissertation, that was written in the context of the post-graduate programme entitled “Earthquake Resistant Design of Structures”, is the earthquake-resistant design and assessment of a curved bridge with base isolation.

However, a presentation of the structure has to precede, which presents many irregularities with principal that of the application of the seismic isolation and energy dissipation devices. Information is given about those systems, and a short reference to their advantages and disadvantages according to bibliography.

For the next step, in order to analyse the structure with an elastic analytical method, certain presuppositions have been, presented in detail. With concern are also confronted certain matters of modelling, in the general frame of which parametrical analyses are conducted wherever it is considered necessary.

Furthermore the procedure of seismic design is repeated with a more exact method. For this purpose, inelastic dynamic time history analyses have been used, based on synthetic accelerograms, whereas the behaviour of passive systems is approached via appropriate elastoplastic models. The results of equivalent elastic methods are compared with those of a more precise method, the inelastic dynamic one.

The study of the bridge is completed with the assessment of the seismic behaviour. Inelastic dynamic analyses are also used based this time on real motions. The accelerograms are reduced to the same seismic intensity for two levels of performance, the first being “life safety” and the second “collapse prevention”. In addition, section analyses have been conducted with specialised software, in order to determine the relation of moment and curvature of the sections and the interaction of moment strength and axial load.

Finally, conclusions have been reached as regards the possibility and the precision of equivalent elastic methods modeling multiple degrees of freedom (MDOF) systems of non proportional damping, like the given bridge on one hand. On the other the influence and the peculiarities of the seismic isolation on the behaviour of the structure.