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# Inelastic dynamic analysis of RC bridges accounting for spatial variability of ground motion, site effects and soil–structure interaction phenomena. Part 2: Parametric study

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## SUMMARY

The methodology for dealing with spatial variability of ground motion, site effects and soil–structure interaction phenomena in the context of inelastic dynamic analysis of bridge structures, and the associated analytical tools established and validated in a companion paper are used herein for a detailed parametric analysis, aiming to evaluate the importance of the above effects in seismic design. For a total of 20 bridge structures differing in terms of structural type (fundamental period, symmetry, regularity, abutment conditions, pier-to-deck connections), dimensions (span and overall length), and ground motion characteristics (earthquake frequency content and direction of excitation), the dynamic response corresponding to nine levels of increasing analysis complexity was calculated and compared with the 'standard' case of a fixed base, uniformly excited, elastic structure for which site effects were totally ignored. It is concluded that the dynamic response of RC bridges is indeed strongly affected by the coupling of the above phenomena that may adversely affect displacements and/or action effects under certain circumstances. Evidence is also presented that some bridge types are relatively more sensitive to the above phenomena, hence a more refined analysis approach should be considered in their case.


KEY WORDS: bridges; spatial variability; site effects; soil–structure interaction; seismic design

## INTRODUCTION

Several past studies involving bridge structures have focused on the effects of spatial variability of earthquake ground motion, the presence of the subsoil structure, its interaction with the

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