

Advances in the Assessment of Buildings Subjected to Earthquakes and Tsunami

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Abstract

Currently, 8 out of the 10 most populous megacities in the world are vulnerable to severe earthquake damage, while 6 out of 10 are at risk of being severely affected by tsunami. To mitigate ground shaking and tsunami risks for coastal communities, reliable tools for assessing the effects of these hazards on coastal structures are needed. Methods for assessing the seismic performance of buildings and infrastructure are well established, allowing for seismic risk assessments to be performed with some degree of confidence. In the case of tsunami, structural assessment methodologies are much less developed. This stems partly from a general lack of understanding of tsunami inundation processes and flow interaction with the built environment. This chapter brings together novel numerical and experimental work being carried out at UCL EPICentre and highlights advances made in defining tsunami loads for use in structural analysis, and in the assessment of buildings for tsunami loads. The results of this work, however, demonstrate a conflict in the design targets for seismic versus tsunami-resistant structures, which raise questions on how to provide appropriate building resilience in coastal areas subjected to both these hazards. The Chapter therefore concludes by summarizing studies carried out to assess building response under successive earthquakes and tsunami that are starting to address this question.