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AN URBAN SEISMIC RISK AND RESILIENCE MODEL FOR ISFAHAN

Mohsen KOHRANGI
Ph.D., RED – Risk Engineering + Development, Pavia, Italy (formerly at IUSS Pavia)
mohsen.kohrangi@redrisk.com
Paolo BAZZURRO
Professor, University School for Advanced Studies IUSS Pavia, Pavia, Italy
paolo.bazzurro@iusspavia.it
Dimitrios VAMVATSIKOS
Assistant Professor, School of Civil Engineering, National Technical University of Athens, Greece
divamva@mail.ntua.gr

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Many private and public stakeholders are directly or indirectly affected by the impact of earthquakes in a urban area. Therefore, it is crucial for such organizations to know about the overall level of seismic risk that the assets of their concern face. The *portfolio risk assessment* studies that estimate such a risk play a fundamental role in the sustainable development of an urban area, providing local and national authorities and other private decision makers with valuable information for devising the most appropriate risk mitigation actions. These actions include post-disaster emergency planning, building retrofitting campaigns, creation of insurance pools, and strategic urban planning, amongst other measures. The greater Isfahan (32°38′N 51°39′E) is a historical and touristic city in the center of Iran. It has a population of about 1.6 million according to the 2016 Census, the third most populous metropolitan area in Iran after Tehran and Mashhad. According to the seismic zonation of the Iranian design code, Isfahan is located in a seismically moderate zone with reference peak ground acceleration, *PGA*, on rock equal to 0.25g for 475 years return period. Even though the estimated seismicity for Isfahan relative to other seismically active large cities in Iran (such as Tehran, Tabriz and Mashhad) is low, the large number of vulnerable buildings, the large compact population and the importance of the post-disasters functionality of the city (i.e., resilience) for the economy of the country, calls for thorough pre-disaster seismic risk and loss estimation studies. Herein we describe the steps followed to create and interpret a model for assessing the earthquake risk of the city of Isfahan. This includes the procedure and the data used to generate the three ingredients of a risk assessment model, namely the exposure module, the fragility and vulnerability module, the adopted seismic hazard module, and a discussion of the computed seismic risk estimates. The risk assessment is conducted for two likely earthquake scenarios that contribute the most the seismic hazard of Isfahan. In addition, risk estimates in terms of loss maps for 475 and 2,475 year return periods are generated and critically evaluated.