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Seismic risk of old RC buildings: vulnerability evaluation at urban scale to define strengthening programs

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Reinforced Concrete (RC) buildings represent a large portion of the built environment of urban areas in many countries all over the world, including Italy and other Mediterranean earthquake-prone countries. They were frequently designed only for gravity loads before the introduction of seismic code provisions, therefore they have often displayed unsatisfactory seismic behaviour during past earthquakes (e.g. Southern Italy 1980, Turkey 1999, L'Aquila 2009). Fatalities due to strong earthquakes are increasingly determined by RC building collapse (Coburn and Spence, 2002). Therefore, the assessment and reduction of RC building vulnerability are of primary concern in the mitigation of seismic risk.

In this contribution, the approach proposed in previous studies (Masi, 2003; Masi et al., 2015) has been applied to the earthquake loss estimation of a prominent case study made up of about 1500 existing RC buildings located in the urban area of Potenza town, Italy. Starting from an accurate building-by-building survey of the typological characteristics of the RC buildings under examination, mainly carried out by the authors, the expected losses due to appropriately selected scenario earthquakes (Chiauzzi et al., 2012) have been computed, also taking into account site effects.

Results have been analysed in terms of building damage, human consequences and repair costs. Plans for vulnerability reduction have been proposed considering both needed costs and timetable for their implementation. The peculiarities of RC buildings in defining adequate seismic risk mitigation strategies in urban areas are pointed out.

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