

On the role of masonry infills in existing RC buildings under seismic action

Seminar

Corso di Dottorato in Ingegneria Strutturale Geotecnica e Rischio Sismico

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Among natural hazards, earthquakes are paramount due to their impact on civil structures in terms of direct and indirect losses and social impact. Performance evaluation, beyond the traditional goal of life safety, is required to estimate expected losses due to earthquake properly. This is particularly true for Reinforced Concrete (RC) framed buildings with masonry infills - a common structural typology worldwide for civil, strategic, or productive use - since damage to non-structural components, including infills and partitions, may cause danger for human lives and strongly affected economic losses due to past earthquakes. Nevertheless, in current practice, infills are commonly considered as weight only. The way towards a correct assessment of their performance is still long, due to the heterogeneity of infills typology and the several modeling issues to deal with. Research efforts are still necessary to perform a step forward towards future guidelines related to the design of new buildings or the assessment and retrofit of existing buildings considering infills contribution.

Starting from the analysis of data from laboratory tests or post-earthquake damage, and from the knowledge gained in a recent research project funded by AXA-RF, this seminar is focused on the role of infills in RC buildings. The increase in lateral strength and stiffness of RC buildings due to infills will be first quantified, along with their influence on building collapse mechanism and on possible brittle failures in RC members. Possible modelling strategies to numerically reproduce their behavior in nonlinear structural analyses will be shown. Then, fragility functions dedicated to different infill typologies will be presented, along with repair costs necessary to restore their damage. Examples of loss estimation explicitly considering infills in RC buildings will highlight their paramount role, and the necessity of retrofitting solutions, aiming at the reduction of their main vulnerabilities to increase community resilience.