Influence of masonry infill walls on the seismic risk of existing reinforced concrete buildings

Summary

Masonry infill walls contribute to the seismic demand imposed on reinforced concrete buildings, as highlighted by earthquake damage observation. However, infill walls are typically considered as nonstructural elements in seismic design of buildings and therefore potentially lead to inaccurate prediction of seismic performance of the building. The national territory has a significant part of moderate to low seismicity and the application of Eurocode 8 part 3 procedures (for reinforced concrete buildings) leads to very complex analyzes for most existing small and medium-sized buildings with structural regularity. The main goal is to define procedures that allow an expeditious assessment of the seismic safety of a significant class of buildings with structural regularity, considering the behavior of masonry infill walls.

The scientific and technological main objectives of this Research include:

1) Analysis of the influence of masonry infill walls on the structural response to horizontal actions. The scientific literature about this issue can be divided into two research lines: local evaluation of interaction and effect of the infill panels into the global structural response;

2) Model calibration based on Portuguese experimental *in-plane* results available in literature;

3) Numerical modeling of infill walls by the equivalent strut method (macro-model), applied to a universe of buildings representative of a relevant part of the Portuguese housing stock;

4) Performing non-linear static (pushover) analyses and non-linear dynamic analyses on proper structural models of building considering the infill walls and the national seismic hazard;

5) Evaluation of masonry infill walls in simplified methodologies for assessing the seismic safety of existing reinforced concrete buildings in Portugal, based on structural reliability analyses.

Keywords

Masonry infill walls, existing reinforced concrete buildings, non-linear static analyses (Pushover), N2 method, non-linear dynamic analysis, seismic vulnerability, structural reliability.

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