SEISMIC VULNERABILITY OF MASONRY STRUCTURES THROUGH A MECHANICAL-BASED APPROACH

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Assessing the seismic vulnerability on a local scale is a primary aspect within the context of disaster risk reduction. In fact, while national scale vulnerability analyses can be used for a large scale planning, the local scale vulnerability is a more detailed information which can be used for both emergency and mitigation plans. Recently, Italian Department of Civil Protection has promoted and funded CARTIS project which aims at collecting exposure data on a sub–municipal scale.

Our work is based on the idea of exploiting CARTIS exposure data to construct fragility curves valid on a local scale. To this end, a vulnerability assessment method is proposed that uses a finite element model of the masonry structures and an efficient static nonlinear analysis. The finite element model uses bidimensional mixed finite elements characterised by good accuracy at coarse meshes and, therefore, ensures high computational efficiency. The analysis of out–of-plane mechanisms integrates the damage grade quantification. Monte Carlo simulations are used to construct structural models affected by uncertainties. The damage levels follow the European Macroseismic Scale 1998 and SAVE method is adopted to group buildings into vulnerability classes.

The proposed method is tested on a case-study regarding masonry structures in the city centre of Cosenza, in southern Italy.

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