XX CONVEGNO ANIDIS "L'INGEGNERIA SISMICA IN ITALIA"

SPECIAL SESSION:

"SEISMIC DESIGN AND ASSESSMENT OF MASONRY INFILLS: NUMERICAL MODELLING, EXPERIMENTAL TESTS AND PRE NORMATIVE RESEARCH"

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Masonry infills, although traditionally considered non-structural elements, significantly influence the seismic response of buildings. Their interaction with structural frames can alter stiffness, strength, and energy dissipation characteristics, leading to both beneficial and detrimental effects. This special session aims to provide a comprehensive overview of recent advances in the seismic design and assessment of masonry infills, addressing both capacity models and seismic demand evaluation. The session will focus on key areas including numerical modelling strategies, experimental investigations, and codified procedures.

Contributions to the session will address analytical and numerical modelling techniques aimed at capturing the complex in-plane and out-of-plane response of masonry infills and their interaction. Special attention will be given to the infill-frame effects. These models will be explored at various scales, from detailed investigations of single-bay, single-storey infilled frames to global analyses at the building level, enabling a comprehensive understanding of how local infill behaviour influences the overall seismic performance of structures. Particular emphasis will be placed on the coupling between in-plane and out-of-plane phenomena, a critical aspect so far almost neglected in simplified design approaches.

The session will also showcase recent experimental investigations, aimed at characterizing the structural response, damage evolution, and failure modes of infilled systems under seismic loading. Studies addressing the interaction between in-plane and out-of-plane response, and the influence of multi-directional loading, will be particularly relevant. Furthermore, retrofit strategies and strengthening techniques, such as the use of fiber-reinforced composites, engineered mortars, or decoupling devices, will be presented, with a focus on their effectiveness in enhancing the lateral performance.

A key area of interest within the session concerns innovative infill solutions, such as engineered or ductile infill systems designed to overcome the more brittle failure typically associated with traditional unreinforced masonry. These include systems incorporating sliding joints or deformable interface layers, which enable controlled deformation while preserving overall stability. Research exploring their mechanical behaviour, seismic efficacy, and feasibility of integration into both new and existing structures is highly encouraged.

Finally, the session will engage in a critical review of existing national and international design codes, examining how masonry infills are currently treated, whether explicitly modelled, indirectly accounted for, or entirely neglected. Discussions will identify conceptual and practical limitations in current codified approaches. Contributions proposing refined design methodologies, improved empirical formulations, or novel code provisions are particularly welcome.

The session invites researchers and practitioners to share innovative methodologies, benchmark studies, and case applications aimed at enhancing the seismic resilience of infilled structures. The goal is to foster discussion and collaboration toward the development of robust approaches for the seismic design and assessment of masonry infills.

Keywords: Seismic Response; Masonry Infills; Traditional and Innovative Solutions; Strengthening Methods; In-Plane and Out-of-Plane Interaction; Numerical Modelling; Experimental Testing; Pre normative research.