ENFRAG: ENHANCING STATE-DEPENDENT FRAGILITY THROUGH EXPERIMENTALLY VALIDATED ENERGY-BASED APPROACHES

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ABSTRACT

This paper presents the preliminary results of the ENFRAG research project, which is part of the ERIES project (engineering research infrastructures for European synergies). ENFRAG aims at advancing state-dependent earthquake fragility assessment methodologies. The project involves sequential quasi-static cyclic displacement-controlled in-plane (IP) and shaking-table dynamic out-of-plane (OOP) tests on four nominally identical infill walls. Different load protocols are employed to induce the same peak-based engineering demand parameters (EDPs) while modulating the energy-based demands. A multi-fidelity approach is employed to integrate the experimental data with synthetic datasets including IP cloud-based analysis, IP quasi-static, push-pull analyses with different load protocols, OOP dynamic analyses, and IP-OOP combined analyses. The results are used to explore the potential of energy-based EDPs for interpreting damage states and damage accumulation. This allows experimentally validating methodologies to derive state-dependent fragility functions that account for multiple sources/mechanisms of damage accumulation. This contribution provides an update on the numerical and analytical components of ENFRAG, as well as linking them with the specific research objectives.