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DYNAMIC RESPONSE OF MASONRY WALLS: FROM HARMONIC TO NON-STATIONARY EXCITATIONS

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The high seismic vulnerability exhibited by masonry structures during past earthquakes makes the deep understanding of their dynamic behavior a challenging task. Hence, many numerical models, varying from simplified to sophisticated, have been proposed to predict the dynamic response. Among various formulations [1], macromechanical finite element models are widespread, as these represent a good compromise between accuracy and computational effort. Basing on such approach, this work explores the dynamic response of masonry walls by adopting the damage-plasticity constitutive law recently proposed by the authors [2]. The assumed stress-strain relationship captures the strength and stiffness degradation with hysteretic dissipation and the stiffness recovery due to the crack closure typical of masonry subjected to cyclic loads.
The investigation moves from stationary to non-stationary actions, connecting results of past and novel studies. Previous research, focused on slow sweep-type horizontal base acceleration histories, emphasized the influence of the degradation phenomena on the main features of the frequency response curves ($frcs$) of masonry panels [3]. The curves exhibited softening behavior, range with coexistent solutions and not uniqueness characteristic, thus requiring further analyses to identify their role in the dynamic characterization of the system. Hence, different non-stationary loadings, as such impulsive and seismic excitations, are here considered and the obtained results are related to the information that can be deduced from a frc and, eventually, are used to ascertain other signatures to add to the $frcs$ in view of better characterization of the dynamic behavior of degrading structures.

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