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OUT-OF-PLANE CYCLIC PERFORMANCE OF FULL-SCALE MASONRY INFILL WALLS

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ABSTRACT

The experimental characterization of the out-of-plane performance of infill masonry (IM) walls is a topic of growing importance motivated by the damage reconnaissance missions performed by experts to affected regions by earthquakes, where it was reported several number of collapses of this type of partition walls. An experimental campaign was conducted at the Laboratory of Earthquake and Structural Engineering - LESE by performing five experimental cyclic out-of-plane tests of full scale infill masonry walls with and without previous in-plane damage.

The IM walls, as proved in the recent earthquakes, can have an important influence in the structural response of RC structures [1-3]. However, the infills are considered non-structural elements and no special attention is given to them during the design process of new buildings and safety assessment of existing ones. Associated with this comes the problem of lack of detailing and specification of the IM characteristics and construction process. These could result in the decrease of the construction quality of the buildings and especially, due to the interaction with the RC structural elements, the insufficient/deficient behaviour when subjected to seismic action and their tragic consequences. Considering their poor performance in recent earthquakes, some experimental studies have been conducted during the last years to characterize their out-of-plane capacity. The present work presents an experimental campaign carried out in the (LESE) with aim of characterize experimentally the out-of-plane behaviour of five full scale-infill masonry walls with and without previous in-plane damage.

The present experimental campaign was composed by five out-of-plane tests of full-scale infilled RC frames with two main variables: different width support conditions of the panel, axial load on the RC columns application and previous in-plane damage. The outline of the experimental work performed is presented in this section and start firstly by the description of the out-of-plane setup developed in the LESE laboratory followed by the description of specimens tested, instrumentation and loading protocol and the main results obtained. The experimental test setup was developed to apply a uniform distributed load through nylon airbags which main advantage is to mobilize all the infill panel considering all the distributed inertia forces that results of a seismic excitation. The uniform load applied through all the infill panel is reacted against a self-equilibrated steel structure composed by five vertical and four horizontal alignments that are rigidly connected to the RC frame with steel re-bars in twelve previous drilled holes (Figure. 1). From the experimental tests, it was verified that the monotonic test Inf_01 seems to define an envelope of the tests performed cyclically. The monotonic test reached the higher out-of-plane force capacity, taking place this to a level shift out-of-plane panel also it higher. The force degradation was less pronounced observed in the

cyclic tests, mainly after the cycle's repetition for the same target out-of-plane displacement. Regarding the influence of the axial on the columns in the out-of-plane capacity of the IM walls, it was observed that reduces the panel stiffness although increased their out-of-plane strength.

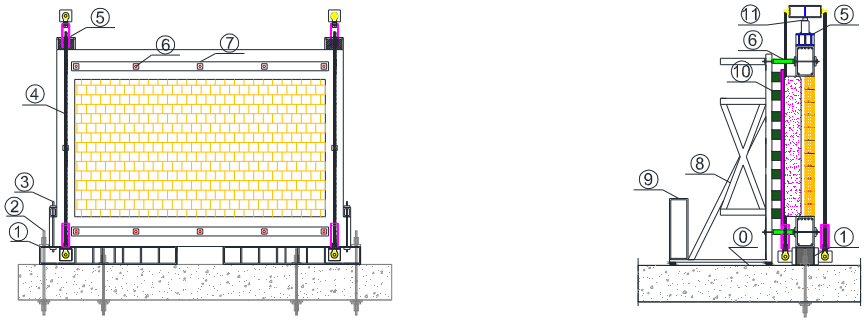

Fig. 1 -. Out-of-plane test platform developed in LESE laboratory

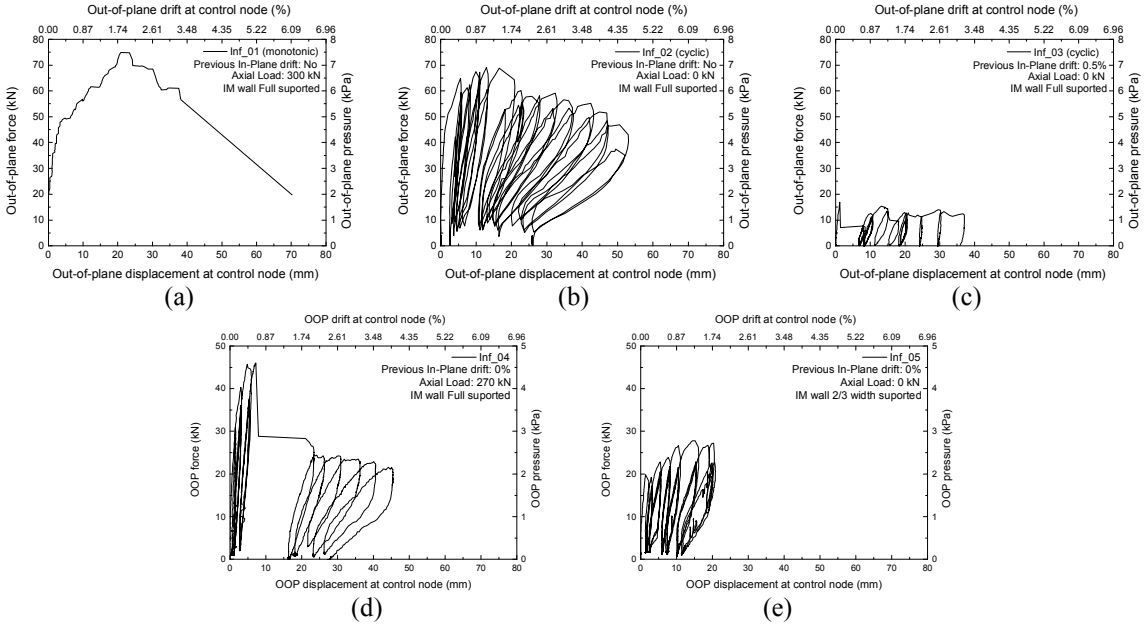

Fig. 2 - Out-of-plane force-displacement test results: a) Inf_01; b) Inf_02; c) Inf_03; d) Inf_04 and e) Inf_05.

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