OUT-OF-PLANE BEHAVIOR OF MASONRY INFILL WALLS

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ABSTRACT

In order to investigate the out-of-plane behaviour of masonry infill walls, quasi-static testing was performed on a masonry infill walls built inside a reinforced concrete frame by means of an airbag system to apply the uniform out-of-plane load to each component of the infill. The main advantage of this testing setup is that the out-of-plane loading can be applied more uniformly in the walls, contrarily to point load configuration. The test was performed under displacement control by selecting the mid-point of the infill as control point. Input and output air in the airbag was controlled by using a software to apply a specific displacement in the control point of the infill wall. The effect of the distance between thereaction frame of the airbag and the masonry infill on the effective contact area was previously analysed. Four load cells were attached to the reaction frame to measure the out-of-plane force.The effective contact area of the airbag was calculated by dividing the load measured in loadcells by the pressure inside the airbag. When the distance between the reaction walls and the masonry infill wall is smaller, the effective area is closer to the nominal area of the airbag.

Deformation and crack patterns of the infill confirm the formation of arching mechanism and two-way bending of the masonry infill. Until collapse of the horizontal interface between infill and upper beam in RC frame, the infill bends in two directions but the failure of that interface which is known as weakest interface due to difficulties in filling the mortar between bricks of last row and upper beam results in the crack opening trough a well-defined path and the consequent collapse of the infill.

INTRODUCTION

Masonry infills are assumed as non-structural elements and are not considered in the design process of the buildings even if their presence considerably changes the behaviour of the buildings. Its presence could have positive or negative effect on the behaviour of the buildings. When it is positive it means that the