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Influence of Strengthening with Perforated Steel Plates on the Behavior of Infill Walls and RC Frame

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Abstract : The contribution of the infill walls to the overall earthquake response of a structure is limited and this contribution is generally ignored in the analyses. Strengthening of the infill walls through different techniques has been and is being studied extensively in the literature to increase this limited contribution and the ductilities and energy absorption capacities of the infill walls to create non-structural components where the earthquake-induced energy can be absorbed without damaging the bearing components of the structural frame. The present paper summarizes an extensive research project dedicated to investigate the effects of strengthening the brick infill walls of a reinforced concrete (RC) frame on its lateral earthquake response. Perforated steel plates were used in strengthening due to several reasons, including the ductility and high deformation capacity of these plates, the fire resistant, recyclable and non-cancerogenic nature of mild steel, and the ease of installation and removal of the plates to the wall with the help of anchor bolts only. Furthermore, epoxy, which increases the cost and amount of labor of the strengthening process, is not needed in this technique. The individual behavior of the strengthened walls under monotonic diagonal and lateral reversed cyclic loading was investigated within the scope of the study. Upon achieving brilliant results, RC frames with strengthened infill walls were tested and are being tested to examine the influence of this strengthening technique on the overall behavior of the RC frames. Tests on the wall and frame specimens indicated that the perforated steel plates contribute to the lateral strength, rigidity, ductility and energy absorption capacity of the wall and the infilled frame to a major extent.

Keywords : infill wall, strengthening, external plate, earthquake behavior
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