

The Effect of an Infill on the Bearing Capacity and Stiffness of Infilled Frames

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Abstract : The application of frames with masonry or panel infill is common in the engineering practice. In these cases, a frame is often considered to be a primary structure, while an infill is considered to be a secondary structure. In past calculations, the infill was rarely included in the design of frame structures in terms of their bearing capacity and safety. Recent calculations of such structures necessarily include the effect of infill since it contributes to stiffness and bearing capacity of overall system, especially under horizontal loads. In certain cases, if the infill is not included in the seismic design of frame structures, the result can be lower design safety. However, since the different configuration of the infill through the building's height can be made, it is possible that contribution of such infill to the overall bearing capacity can be lower and seismic forces on the building can be increased due to greater stiffness of the structure. So far, many experimental and numerical researches on the behavior of infilled frames under horizontal static forces and earthquake have been performed. In this paper, several masonry-infilled concrete and steel frames under horizontal static forces and earthquake are analysed. The experimental results by shake-table and numerical results are compared in terms of the bearing capacity of bare and infilled frames. Herein, the stiffness of frames and infill were varied, with different position of the infill and different types of openings. Cases with positive and negative effects of the infill to the bearing capacity of the frames were considered. Finally, main conclusions and recommendations for practical application and design of masonry-infilled concrete and steel frames are given.

Keywords : bearing capacity, infilled frame, numerical model, shake table

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