

Macroelement numerical simulation of the seismic response of a timber-retrofitted masonry pier

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ABSTRACT

In the North-East part of the Netherlands, induced seismicity due to gas extraction is affecting a local building stock consisting mainly of unreinforced masonry (URM) houses not designed for earthquake resistance. Experimental and analytical studies conducted at EUCENTRE, Pavia (Italy), have demonstrated that buildings with URM cavity-walls structural systems are among the most vulnerable existing Dutch construction typologies. A light and reversible retrofit system made of timber frames and oriented-strands boards was then designed and tested to increase the in-plane and out-of-plane capacities of the masonry piers and to enhance their connections with the floor diaphragms. The development of modelling approaches able to simulate the influence of the retrofit system is of fundamental importance for future applications of the system to real-case existing buildings and for vulnerability studies on different building stocks. Based on a quasi-static in-plane shear-compression test on a full-scale retrofitted masonry pier, a specific macroelement was calibrated to capture the effects of the retrofit on the in-plane flexural and shear resistances. This paper discusses the numerical simulation of the seismic response of the retrofitted masonry pier.