Experimental study on the shear behavior of FRCM strengthened masonry panels

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ABSTRACT

Innovative strengthening solutions, such as Fiber Reinforced Cementitious Matrix (FRCM), are becoming increasingly diffused for the retrofitting of existing masonry structures with the aim of reducing the seismic vulnerability of these construction typologies. In recent years, many studies have demonstrated the suitability of these materials in enhancing the shear capacity of masonry walls and improve the overall structural behaviour, avoiding fragile collapse mechanisms [1-3].

In the present work, six diagonal compression tests were performed on un-strengthened and FRCM strengthened masonry panels to evaluate the improvements, in terms of shear strength and stiffness, attributable to the presence of the FRCM systems. Two different bidirectional basalt grids were applied to the masonry samples, with and without mechanical anchorages. The tensile and bond properties of the chosen FRCM systems were investigated through laboratory tests. The objective was, indeed, to compare the performances of two textiles, characterized by different densities, and to investigate the role of mechanical anchorages.

The experimental results confirmed the efficiency of the FRCM strengthening systems in improving the shear behaviour of masonry panels. The FRCM strengthened samples experienced a considerable strength increase and less brittle failure mechanisms. The roles of both the mortar matrix and the fiber grids were highlighted by analysing the onset of cracking and the failure propagation within the samples. In particular, the presence of the fibers and of the mechanical anchorages was significant mostly in the post-peak phase. The best performances were observed for the low-density basalt bidirectional grid, which resulted to be more effective in influencing the post-peak behaviour, confirming also the results obtained during the mechanical characterization of the composite materials.

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