Experimental investigation for in-plane shear strengthening of masonry walls with FRCM

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ABSTRACT

Heritage buildings, all over the word, are marked out by singular structural characteristics of which it is necessary to asses, and eventually improve, the seismic safety in order to preserve the artifatcs'architectural value [1]. In a previous contribution [2] the peculiar feature of the "*in falso*" bearing walls, built without a direct load path to the ground and laying on the below vaults, has been highlighted as a recurrent circumstance in Italian Renaissance architecture. That occurrence, in case of seismic action, could trigger a sort of domino effect, due to possible breakage of the underlying masonry vaults, causing inevitably the collapse of the entire structure. In the perspective of its strengthening it is necessary to act in compliance with the valuable elements of the building such as marble floors and precious stuccos without further increasing the existing structures with the weight of additional gears non-canonical if compared to the structural genesis of the building. In this framework the role of the F.R.C.M. (Fiber Reinforced Cementitious Matrix) is ascribed by reference to the multiple benefits, also in the lower environmental impact, reported in the scientific literature [3,4].

The present paper's aim is to present the outcomes of the experimental tests conducted in partnership with the Kimia S.p.a. in order to evaluate the incidence of those next-gen composite materials'application regarding the prevention of the dangerous in plane wall's collapse. The researches has been conducted on 3 rectangular walls samples characterized by the same start traits about geometry features, masonry texture and material's mechanical properties: the first one in unreinforced masonry, the second enanched by a widespread application of the composite material and the last presenting a bonding with strips of in order to configures as a truss beam. Also the experimental setup in terms of loads'application and constraint modalities were equal. With the aim of bringing the specimens to failure, a steel contrast system has been designed to make a self-balanced assembly and the respective breaking loads were applied by mean of a hydraulic flat jack. Furthermore a monitoring system has been to record the increasing of the applied load and the structures'deformations in relation to the duration of the tests which had as a final moment the complete breaking of the masonry panels. In addition the breaking load has been also evaluated in relation to increasing of cracking pattern, (given the presence of the plaster) surveyed only thanks to the use of a thermal camera combined with a previously implemented post-processing algorithm aimed at the wall texture damage analysis [5].

The final outcomes has been evaluated by comparison relating the masonry panels'resistance to two different methods of in-work implementation the time and the skills required for their fulfillment.

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