

TRM-strengthened timber cross vaults subjected to vertical settlements

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ABSTRACT

Two full-scale timber cross vaults subjected to vertical settlements in one of their supports were tested at the *ICITECH* laboratories of the *Universitat Politècnica de València*. In one of the vaults a support was moved downwards, while the other was subjected to upward-downward displacements in one support. Both tests are described and analysed in detail in Torres et al. [1,2].

Both vaults presented certain levels of post-test damage in the form of cracks and significant displacements. In order to analyse the effectiveness of the reinforcement of previously damaged vaults, both were strengthened with TRM and subjected to further testing in which vertical settlements were applied to one support.

The TRM strengthening comprised an extrados layer composed of a 25x25 mm glass grid embedded into two approximately 5 mm thick layers of cementitious matrix. The TRM strengthening was able to withstand higher peak loads and prevent the formation of cracks along the extrados surface of the structure, while as expected, ductility increased.

A 3D macro-modelling FE strategy on Abaqus commercial software was also adopted to study the behaviour of the vaults during the tests.

REFERENCES

- [1] B. Torres, E. Bertolesi, P.A. Calderón, J.J. Moragues, and J.M. Adam. "A full-scale timber cross vault subjected to vertical cyclical displacements in one of its supports", *Eng. Struct.* Vol. 183, pp. 791-804, (2019).
- [2] B. Torres, E. Bertolesi, J.J. Moragues, P.A. Calderón, J.J. Moragues, and J.M. Adam. "Experimental investigation of a full-scale timber masonry cross vault subjected to vertical settlement", *Constr. Build. Mater.* Vol. 221, pp. 421-432, (2019).