

Specimen size sensitivity on diagonal compression tests for masonry

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Experimental testing on masonry specimens is an important field of study for obtaining actual information on material properties, which becomes input information to effectively carry out structural analysis and to design potential strengthening interventions. In both cases, the definition of an accurate numerical model of a masonry structure is fundamental, hence material properties should be determined precisely. When historical masonry specimens are tested (in-situ, taken from site to laboratory, or constructed in laboratory by simulating historical material properties), the quasi-brittle material behaviour given by the poor mechanical properties/ performance of the masonry constituents, pose several challenges.

Several authors have already recognized these issues and suggested modifications to the testing rules [1], by modifying specimen and load orientation [2], or by proposing specimens with a reduced scale [3]. The latter approach can be considered successful, as it proposes a valid possibility to perform larger number of tests, allowing for a better reproducibility and reliability.

This work focuses on the evaluation of the size sensitivity of the masonry specimen on the results of diagonal compression tests and their interpretation in terms of masonry shear behaviour. Two different specimen sizes are assumed and tested, first square wallets with width and height equal to 0,5 m, and modified masonry triplets, composed of three brick courses. In both the cases Italian 'standard' clay bricks are adopted (0,25 x 0,12 x 0,05 m³), with mortar joints of 1 cm thickness and the 'running bond' masonry texture is considered. The test results are investigated by focusing on masonry shear stiffness and strength. The deformations are captured by adopting a simple and effective non-contact measurement technique based on Digital Image Correlation (DIC).

Keywords: masonry, shear behaviour, diagonal compression test, specimen size.

References:

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