

Experimental Investigation on the Mechanical Behaviour of Three-Leaf Masonry Walls under In-Plane Loading

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Abstract : The present paper illustrates an experimental approach to provide understanding of the mechanical behavior and failure mechanisms of different typologies of unreinforced three-leaf masonry walls of historical Islamic architectural heritage in Egypt. The main objective of this study is to investigate the propagation of possible cracking, ultimate load, deformations and failure mechanisms. Experimental data on interface-shear and compression tests on large scale three-leaf masonry wallets are provided. The wallets were built basically of Egyptian limestone and modified lime mortar. External wallets were built of stone blocks while the inner leaf was built of rubble limestone. Different loading conditions and dimensions of core layer for two types of collar joints (with and without shear keys) are considered in the tests. Mechanical properties of the constituent materials of masonry were tested and a database of characteristic properties was created. The results of the experiments will highlight the properties, force-displacement curves, stress distribution of multiple-leaf masonry walls contributing to the derivation of rational design rules and validation of numerical models.

Keywords : masonry, three-leaf walls, mechanical behavior, testing, architectural heritage

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