

Compressive Behaviour of Bonded brickwork Wallettes with various thicknesses: Experimental and Numerical Verification

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ABSTRACT

Bonded brickwork loadbearing walls are commonly seen in many colonial period structures around the world; however, most research studies in the past and the current design provisions are primarily based on single leaf brickwork. Due to the anisotropic nature of brickwork, the strength and deformation characteristics would be different for bonded brickwork walls and their design using provisions of single leaf bonded brickworks may be unconservative. Therefore in order to understand the compressive behaviour of differently bonded brickworks, an experimental programme followed by a numerical investigation were carried out in this research. The experimental programme comprised of 24 wallettes tested under uniaxial compression. Different types of bricks and bonded thicknesses (single, double and triple) were used to construct the wallettes in the experimental programme. A lime mortar similar to the mortar found in the colonial structures was used to construct all types of wallettes. The experimental results are presented and discussed in terms of failure modes, compressive strengths and stress-strain responses obtained. Further a numerical investigation based on the micro modelling approach was employed to verify the experimental findings. The experimental and numerical modelling results indicated that the change in brickwork thicknesses did not significantly increase the compressive strength of the masonry. The increased number of weak perpendicular joints in the thicker wallettes, could be a reason of lower strength and thus, a general notion of increment in compressive resistance due to the reduction in slenderness is not applicable for bonded brickwork. Parametric analyses were also carried out for different slenderness ratios to extend the understanding on the behaviour of bond brickworks under compression and reported in the full paper.