

Response of Sand-Lime Mortar Joints to Variable Eccentric Thrust

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Abstract:

The response of mortar joints made of lime mortar and control specimens made with modern portland cement-lime mortar was investigated under variable repeated eccentric loading. Prism specimens were constructed with either a sand-lime mortar or a Portland cement-lime mortar. Each prism was subjected to a sequence of variable cyclic compressive loading, with the load range increasing to the failure of the specimen. The relative displacement of the blocks was measured at all four corners at a location as close to the mortar joint as possible and at the ends of the blocks, in order to determine the shortening and relative rotation of the specimen, and the contribution of the mortar joint. The sand-lime mortar joints were found to have considerably more energy absorption capacity under this loading program than the Portland cement-lime mortar joints. Moreover, much larger displacement of specimens using lime mortar precede the attainment of the ultimate load. The yield surface of the sand-lime mortar joint is constructed using a generalized yield function with linear hardening, with the hardening constants determined from measured deformations. It is concluded that a sand-lime mortar jointed ashlar masonry system can be appropriately modeled with rigid blocks and joints which deform according to linear hardening plasticity with an associated flow rule.

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