

Elastic Stability of URM Walls Under Transverse Loading

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Abstract:

The buckling behavior of unreinforced masonry (URM) walls subjected to out-of-plane lateral loads is described including numerical solutions for critical axial load capacity based on the theory of elastic stability. The formulation includes the influence of cracking on cross section capacity and second-order effects due to lateral displacement of the wall. Third-order polynomial expressions are found to describe the numerical solution for normalized critical axial load as a function of a bending moment parameter for four combinations of support conditions and lateral load distribution. The influence of bending on buckling capacity is illustrated, and the nonlinear interaction between critical load and out-of-plane bending is discussed. The error introduced by the assumption of a linear, elastic material is investigated by comparing the elastic stability solution with a nonlinear solution available in the technical literature for a cantilever wall under concentrated top load.

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