

Development of Masonry Wall Resistances and Fragilities for Out-of-Plane Wind Loads

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Abstract:

The study deals with finite element calculations of wind load resistances for unreinforced and reinforced masonry walls and the development of wall collapse fragilities for use in modeling of building failures under out-of-plane wind loads. The developed finite element models of unreinforced and reinforced masonry walls were validated against experimental results from published literature. The experimentally validated models were used to study the influence of different variables on the out-of-plane wind load resistances of masonry walls such as wall length, height, thickness, masonry strength, vertical reinforcements, support conditions, and combined loading effects. Based on the responses obtained from the finite element simulations, a parametric model was developed to calculate the wall resistances. The results of the parametric model were used to develop wall collapse fragilities under wind loads by using load and resistance-based modeling utilizing Monte-Carlo simulation.

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