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# Numerical Simulations on the Torsional Behavior of Multistory Concrete Masonry Buildings

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**Abstract :** The use of concrete masonry constructions in developing countries has become very frequent, especially for domestic purpose. Most of them with asymmetric wall configurations in plan resulting in significant torsional actions when subjected to seismic loads. The study consisted on the finding of a material model for hollow unreinforced concrete masonry and a validation with experimental data found in literature. Numerical simulations were performed to 20 buildings with variations in wall distributions and heights. Results were analyzed by inspection and with a non-linear static method. The findings revealed that eccentricities as well as structure rigidities have a strong influence on the overall response of concrete masonry buildings. In addition, slab rotations depicted more accurate information about the torsional behavior than maximum versus average displacement ratios. The failure modes in low buildings were characterized by high tensile strains in the first floor. Whereas in tall buildings these strains were lowered significantly by higher compression stresses due to a higher self-weight. These tall buildings developed multiple plastic hinges along the height. Finally, the non-linear static analysis exposed a brittle response for all masonry assemblies. This type of behavior is undesired in any construction and the need for a material model for reinforced masonry is pointed out.

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