

Modeling Structural Collapse Including Floor Slab Contributions

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ABSTRACT

When designing for the limit state of collapse prevention, engineers must be able to compute the ways in which structural components fail and how the failure of one or several members can affect the response of an entire structural system. Past research on the response of structures under extreme loading conditions, including progressive collapse, has focused on structural frames with only limited attention given to other structural components. Though often not modeled explicitly, concrete floor slabs can contribute significantly to overall structural performance during extreme loading events, and the ability to efficiently include nonlinear slab behavior in structural models is important for assessing the collapse potential of a structure. In this paper, the authors address the importance of accounting for floor slab contributions in carrying out collapse simulations of structures. Modeling approaches include simplified “equivalent frame” models and high-fidelity finite element models. Preliminary findings suggest that floor slab contributions to collapse resistance are significant and should be accounted for when assessing the performance of structures.

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