Modeling the impact of failed members for progressive collapse analysis of frame structures

Author(s): Kaewkulchai G (Kaewkulchai, G.), Williamson EB (Williamson, E. B.)

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Abstract: During the past decade, increasing attention has been focused on the design of buildings to resist progressive collapse. Previously, the authors presented a nonlinear solution procedure for progressive collapse analysis of planar frame structures. In the current study, a modeling strategy to account for the impact of failed members against other structural components is developed to extend the capabilities of the initial models. Assumptions made in approximating the effects of impact on the overall behavior of frame structures are discussed. An example illustrating the importance of accounting for the effects of impact on predicting progressive collapse is also given. Results indicate that the impact velocity plays the most significant role in causing failure of intact beam elements.

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Reprint Address: Kaewkulchai, G (reprint author), Univ Texas, Dept Civil Environm & Architectural Engn, 1 Univ Stn,C1748, Austin, TX 78712 USA

Addresses:
1. Ubonratchathani Univ, Dept Civil Engn, Ubon Ratchathani 34190, Thailand

E-mail Addresses: griengsak@ubu.ac.th, ewilliamson@mail.utexas.edu

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