INELASTIC ANALYSIS OF STEEL FRAMES WITH COMPOSITE BEAMS

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ABSTRACT: This paper describes a method of inelastic analysis that provides the necessary degree of accuracy for studying the limit-state behavior of steel frames with composite floor beams subjected to the combined action of gravity and lateral loads. An inelastic formulation is proposed to model the composite beams based on the moment-curvature relationship of a composite beam section under positive and negative moments. Steel columns are modeled using the plastic hinge approach. To ascertain the accuracy of the composite beam model, two composite beams and a steel portal frame are analyzed and the results are compared with those obtained from tests and the more established results. Finally, the robustness of the model is demonstrated by studying 2D and 3D building frames using various floor beam models so that their effects on the serviceability deflection and limit load can be compared.