 Proceedings of ICCES'08, pp.963-963

Moment-Axial Tension Parallel Hinge Model for Progressive Collapse Analysis of Welded Steel Moment Frames

Cheol-Ho Lee[1], Kyungkoo Lee[2], Seonwoong Kim[3], Kyuhong Han[4]

Summary

In this study, a parallel hinge model is proposed for a simplified but efficient nonlinear static or dynamic progressive collapse analysis of welded steel moment frames. To this end, the load-resisting mechanism of the column-removed double-span beams in welded steel moment frames was first investigated by using material and geometric nonlinear parametric finite element analysis. The beam span-to-depth ratio was shown to be the most influential factor governing the catenary action of the double-span beams. Piece-wise linear moment-rotation and tension-elongation relationships were then developed for a moment-axial tension parallel hinge model that can simulate complex moment-axial tension interaction during the column-missing event. The proposed model was verified using high-fidelity inelastic dynamic finite element analysis of three and nine story steel moment frames.

[1]Professor, Dept. of Architecture, Seoul National University, Korea. E-mail: ceholee@snu.ac.kr

[2]Post-doctoral researcher, Dept. of Architecture, Seoul National University, Korea. E-mail: klee21@snu.ac.kr

[3]Graduate student, Dept. of Architecture, Seoul National University, Korea. E-mail: corea13@snu.ac.kr

[4]Graduate student, Dept. of Architecture, Seoul National University, Korea. E-mail: radhans@empal.com