Abstract

Presented in this paper is the comparison of a steel moment resisting frame designed by the Performance based Plastic design method and conventional elastic design method based on the seismic evaluation done by both nonlinear static (Push over Analysis) and nonlinear dynamic analysis (Time history analysis) under different ground motions using the SAP2000 software. The Performance based Plastic design is a displacement based method which uses pre-selected target drift and yield mechanisms as design criteria whereas the elastic design method is based on the conventional force based limit state method. The nonlinear static pushover analysis shows formation of hinges in columns of the frame designed using elastic design approach leading to collapse. Whereas in the Performance based Plastic design method, formation of hinges is seen in the beams and bottom of base columns. Although the ground motions caused large displacements in the Performance based Plastic design frame as it was seen from the acceleration and displacement responses obtained from the nonlinear time history analysis, the structure did not lose stability. Study of hysteretic energy dissipation results reveals that the Performance based Plastic design method is superior to the elastic design method in terms of the optimum capacity utilization.
Comparison of Elastic Design and Performance Based Plastic Design Method Based on the Inelastic Response Analysis using SAP2000

References

- Lee SS, Goel SC. 2001. "Performance-Based design of steel moment frames using target drift and yield mechanism." Research Report no. UMCEE 01-17, Dept. of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI.

Index Terms

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Keywords

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