

## **Stochastic Finite Element Analysis of Concentrically Braced Frames to Earthquake Forces**

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### **Abstract**

In this study, conventional frame, D, V and  $\Lambda$  types concentrically braced steel frame systems subjected to earthquake ground motion were analyzed according to stochastic finite element method. During stochastic analysis, displacements and sectional forces of the systems are obtained from perturbation and Monte Carlo methods by using uncertainties of material characteristics. The formulations of these methods are given. The young modulus is chosen as random variable. Coefficient of variation (COV) is selected as 10% for this random variable. Perturbation Method is realized by using a FORTRAN based program, and a different FORTRAN based program was coded for the Monte Carlo Method (MCS). The results show that perturbation method gives close results to MCS method. In addition,  $\Lambda$  type braced frame system gives the best results in respect of the other systems.

**Keywords:** Stochastic Finite Element Method, Monte Carlo Method, Perturbation Method, Braced Frames.