

Bruce Maison Presentations
November 2008

Mr. Bruce Maison was recipient of the 2007 EERI/FEMA Professional Fellowship in which he studied the seismic behaviors of steel buildings under the guidance of Prof. Kasai (Tokyo Tech.) and Prof. Deierlein (Stanford University). He will present two talks about his work (references: Maison *et al.* 2006, 2009).

1. Seismic Performance of Kobe and Northridge Steel Buildings

The performance of two typical mid-rise office buildings is compared: a 5-story building located in Kobe, Japan, and a 6-story building located in Northridge, California, U.S. They were built prior to the milestone 1994 Northridge earthquake (in California) that revealed potentially detrimental brittle behavior of welded steel moment-frames, and both suffered earthquake damage. Extensive computer earthquake simulations were performed from which the building behaviors were determined. The objective was to explore the difference in seismic fragility for this class of buildings in Japan and the United States. It was found that the Japan building is more rugged than the U.S. building under similar earthquake conditions.

2. Performance-Based Earthquake Engineering Evaluation of E-Defense Collapse Test

A full-scale four-story building was shaken to collapse on the E-Defense shake table in 2007. This welded steel moment-frame office building is used as a case study to assess performance-based engineering guidelines. Computer models of the buildings were formulated and analyses conducted to simulate the building response during the experiment. The building was then evaluated using U.S. performance-based earthquake engineering (PBEE) guidelines: *Seismic Rehabilitation of Existing Buildings (ASCE-41)* and *Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings (FEMA-351)*, for the Collapse Prevention performance level via linear and non-linear procedures. The guidelines had mixed results regarding characterization of collapse and no single approach was superior. The methods are summarized and recommendations are made regarding guideline use and development.

References:

Maison, B.F., Kasai, K., and Ooki, Y., 2006. "Relative Performance of Kobe and Northridge WSMF Buildings," *Earthquake Spectra*, **22**(4), November.

Maison, B.F., Kasai, K., and Deierlein, G., 2009. "ASCE-41 and FEMA-351 Evaluation of E-Defense Collapse Test," to be published in *Earthquake Spectra*.