

SEMINAR

Friday, March 4, 2011

9:00 – 9:45 am

Seminar Room 4080 AIR Building

SOCIO-ECONOMIC EFFECT OF SEISMIC RETROFIT OF BRIDGES FOR HIGHWAY TRANSPORTATION NETWORKS: A PILOT STUDY

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A simulation-based pilot study is performed to evaluate the socio-economic effect of seismic retrofit of bridges using Caltrans' Los Angeles area highway network as testbed. 47 scenario earthquakes that represent the regional seismic hazard, consistent with the USGS hazard data are used for this purpose. Two sets of bridge fragility curves, for before and after seismic retrofit, are developed and used to simulate the seismic performance of the network in both cases. The analysis estimates the total societal cost arising from drivers' delay and loss of opportunity cost in the damaged network. The benefit of seismic retrofit is computed as present values of the total future economic loss avoided both from societal cost and from repair/restoration cost over the remaining bridge service lives. Estimated benefit is compared with the retrofit cost to establish the benefit-cost ratio. Study shows that from Caltrans' point of view bridge seismic retrofit is cost-effective when loss avoided due to societal cost is considered.

Dr. Shinozuka is a world-renowned expert in earthquake and structural engineering. He is especially interested in field theory and risk assessment methodology in civil engineering.

Dr. Shinozuka's research focuses on continuum mechanics, micromechanics, stochastic processes and fields, structural dynamics and control, and earthquake and wind engineering. He also studies systems engineering, with an emphasis on structural and system reliability; risk assessment of lifeline systems, including water, electrical power and transportation networks; and analysis of the socio-economic impacts of natural disasters. He also is interested in advanced technologies, specifically remote sensing and geographic information systems (GIS) for disaster assessment and mitigation, smart materials and structures, and nondestructive evaluation.

The applications for his work are in earthquake engineering in buildings, bridges, lifeline and environmental systems. His work highlights the multidisciplinary aspects of infrastructure system problems.

Dr. Shinozuka is a member of the National Academy of Engineering.