Risk and Resilience of Highway Bridges under Individual and Multiple Hazards

The present worldwide thrust on building and maintaining sustainable civil infrastructures requires all infrastructural components to be resilient enough (in addition to meeting the loading demand) such that economic and societal impacts of natural and manmade disasters can be minimized. Bridges are among the most important and vulnerable components of roadway transportation systems, and thus evaluation of bridge resilience is important to quantify, and possibly improve, the disaster resilience of roadway infrastructure systems. This seminar will showcase performance evaluation of roadway bridges with particular emphasis on risk and resilience under natural disasters. Development of bridge vulnerability models for real-life and representative bridges under individual and multiple regional hazard scenarios will be discussed. Quantified bridge vulnerability information is applied to a risk evaluation framework that combines hazard probability and bridge failure consequences including direct and indirect incurred losses. Information gathered on bridge vulnerability, calculated losses and post-event recovery options are integrated to quantify bridge resilience. Different seismic bridge retrofit techniques are explored to investigate the suitability of such practices in enhancing seismic resilience of bridges. Similar strategy is also adopted to identify optimal bridge retrofit option(s) under multihazard scenarios.

Dr. Swagata Banerjee is an Assistant Professor in the Department of Civil and Environmental Engineering at Penn State. Her research interest and expertise include structural performance assessment under multiple natural hazards, risk and reliability analysis, risk mitigation, estimation of resilience for civil infrastructure at component and system levels, and the use of advanced structural materials. Her ongoing research focuses on multihazard risk of highway bridges under the combined effect of earthquake and flood-induced scour. She is also investigating optimal bridge retrofit strategies to enhance disaster resilience of highway transportation systems. Dr. Banerjee has authored nearly forty technical papers in international journals and conference proceedings. She is the vice-chair of ASCE subcommittee: Disaster Resilience of Structures, Infrastructures and Communities. Dr. Banerjee is the recipient of 2012 Harry West Teaching Award at Penn State.

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Seminar is FREE and open to the public. Attendance is required for all enrolled Civil Engineering graduate students. For parking please see link for visitors at www.jhu.edu and select information on Homewood Campus.