University at Buffalo
Department of Civil, Structural and Environmental Engineering
School of Engineering and Applied Sciences

ENGINEERING SEMINAR

Experimental and Analytical Studies on the Nonlinear Seismic Performance of Actual Buildings

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Dr. Stavridis' research group investigates techniques to assess and improve the seismic performance of existing reinforced concrete and masonry structures, as well as methods to improve the design guidelines for new construction. The group is currently developing detailed numerical and simplified analytical tools to quantify damage and simulate the seismic performance of such structures. These tools, validated with data obtained from recently tested large-scale structures in the laboratory and actual buildings in the field, are disseminated to engineering practice through documents such as ASCE 41-17. This seminar will discuss two excerpts from the ongoing work.

Nonlinear Response of a Dynamically Tested Structure at Different Damage Levels

This presentation will discuss the dynamic tests of a two-story masonry-infilled reinforced concrete building. The structure, located in El Centro, California, had already been subjected to four earthquakes with epicenters in close proximity and was to be demolished due to the extended damage. Additional damage was introduced during the testing sequence by demolishing perimeter infill walls in three stages. Dynamic tests were conducted using a strong eccentric-mass shaker. The nonlinear response of the structure was recorded through an array of accelerometers and displacement transducers. The recorded data provide insight into the nonlinear response of damaged structures to dynamic loads. Moreover, the effect of the amplitude and frequency of excitation on the dynamic properties in terms of the resonant frequencies, operational shapes, and damping will be discussed.

Noninear Modeling of the Seismic Performance of a School Building During the 2015 Nepal Earthquake

This presentation will discuss the simulation of the performance of a four-story school building in Sankhu, Nepal after the 2015 Gorkha Earthquake. The structure had a masonry-infilled RC frame, which was severely damaged during the earthquake. The concentration of damage in the south end of the ground story indicates that the frame exhibited torsional response to the ground excitation. The seismic performance of the building is simulated in this study with a three-dimensional model of the building which utilizes the strut modeling approach for infilled frames. The struts are calibrated using a novel approach, based on a recently proposed simplified analytical tool for such structures. The simplified tool is validated with detailed FE models that combine the smeared and the discrete crack modeling approaches. The presentation will discuss the accuracy of the numerical model in simulating the seismic performance and in estimating the identified modal properties of the damaged building.

Date: Friday, March 3rd, 2017 Time: 11.00 am
Location: 140 Ketter Hall, North Campus, University at Buffalo