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 Infilled RC Frame with Sliding Joints

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The focus of Dr. Stavridis' research group is on 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 simulate the seismic performance of such structures, quantify damage, and assess novel retrofit strategies. 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 provide an overview of the group's recent research activity and will discuss in detail one of the ongoing research projects.

Abstract

Predicting and improving the seismic performance of masonry-infilled reinforced concrete frames is a major challenge for practicing engineers and researchers due to the highly nonlinear behaviors and interaction of the masonry panel and the bounding RC frame. Under seismic loads these structures can experience catastrophic failures due to the development of brittle shear failures in the masonry infill and, more importantly, in the RC members. The design details and effectiveness of a recently proposed retrofit scheme has been investigated through an extensive experimental and numerical study in UB. The retrofit scheme introduces sliding joints which divide the infill into subpanels and effectively trade strength for ductility. These panels are allowed to slide along the joints providing flexibility and ductility to the structure.

Four frames, including a control specimen with a regular solid infill and three specimens with different detailing of the sliding joints, were recently tested at the SEES Laboratory in UB. The behavior of the test-structures is currently analyzed and simulated with detailed finite elements. The adopted modeling scheme combines the discrete and smeared-crack approaches to capture the different failure modes of the infilled RC frames, including the mixed-mode fracture of mortar joints, the crushing and cracking of the masonry units, and the flexural and shear failure of RC members. The presentation will discuss the philosophy, design procedure, and construction details of the infills with the sliding subpanels. It will also provide an overview of the experimental and numerical results from the four specimens.

Date: Friday, September 8th, 2017 Time: 11.00 am
Location: 140 Ketter Hall, North Campus, University at Buffalo