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Controlled-Rocking of Steel Structures with Replaceable Energy-Dissipating Fuses

Jerome F. Hajjar, Ph.D., P.E.

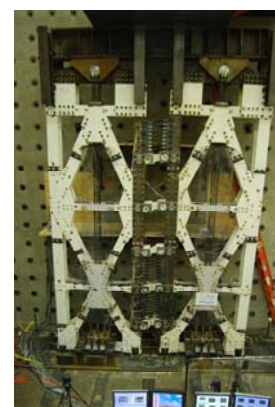
*Professor and Narbey Khachaturian Faculty Scholar
Department of Civil and Environmental Engineering
University of Illinois at Urbana-Champaign*

217-244-4027; 217-265-8040 (Fax); 217-714-7361 (Cell); jfhajjar@illinois.edu



ABSTRACT

This presentation will summarize research on controlled rocking of steel frames with replaceable energy-dissipating fuses. This seismic-resisting structural system seeks to eliminate residual drifts and concentrates the majority of structural damage in replaceable fuse elements, thus minimizing the number of structural elements that require repair or replacement after an earthquake, and enabling structures to be re-useable after major seismic events. A multi-institution, international research project is underway to develop and validate the performance of the controlled rocking system. This presentation will focus on the results of recently-completed half-scale, three-story specimens tested in the Network for Earthquake Engineering Simulation (NEES) MUST-SIM facility at the University of Illinois. Ongoing research includes a series of shake-table tests that will be conducted on the structural system this summer at the E-Defense shake-table facility in Miki, Japan.



Jerome F. Hajjar is a Professor and Narbey Khachaturian Faculty Scholar in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. He has served as chair of the Structures Faculty for the last three years. From 2005-2007, he served as the Deputy Director of the NSF Mid-America Earthquake Center, and he has served as Information Technology Director for the NSF George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) experimental testing facilities at the University of Illinois and the University of Minnesota. His research and teaching interests include analysis, experimental testing, and design of steel and composite steel/concrete building and bridge structures, regional loss assessment, and earthquake engineering, and he has published over 100 papers and edited three books on these topics. Prior to joining the University of Illinois in 2005, he was a Professor at the University of Minnesota since 1992 and a structural engineer and associate at the architectural/engineering firm of Skidmore, Owings & Merrill in their Chicago and New York offices from 1988-1992. Dr. Hajjar is on the AISC Specification Committee and several of its task committees, including chairing Subcommittee 6 on Composite Construction for the AISC Seismic Design task committee; he is the past-chair of the NEES Information Technology Strategy Committee; and he is the past chair of the American Society of Civil Engineers (ASCE) Technical Administrative Committee on Metals. Hajjar was made a Fellow of ASCE in 2007, and was awarded the 2009 ASCE Shortridge Hardesty Award, the 2005 AISC T. R. Higgins Lectureship Award, the 2004 AISC Special Achievement Award, the 2003 ASCE Walter L. Huber Civil Engineering Research Prize, and the 2000 ASCE Norman Medal for his research on steel and composite structures, structural stability, and earthquake engineering. Dr. Hajjar is also a registered professional engineer in Illinois and Minnesota.