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PERFORMANCE LIMITS AND COLLAPSE PROBABILITIES FOR NONDUCTILE RC BUILDINGS

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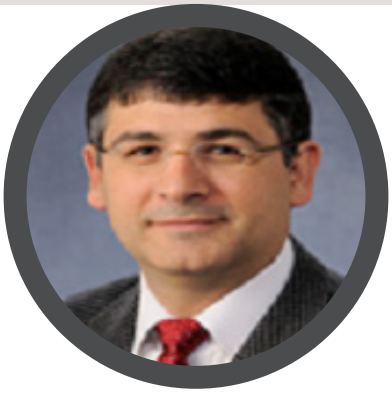
Recent earthquakes in Taiwan and Mexico City have shown that non-ductile reinforced concrete buildings present a great risk to human life because of their high probability of collapse during strong earthquakes. Among the population of older buildings, it is of utmost importance to identify the characteristics that increase the likelihood of failure of the gravity load system so that the most dangerous buildings can be singled out for corrective actions. Evaluation standards, such as ASCE-41, are increasingly being adopted by local authorities in the United States for this purpose. Building assessments are performed by estimating the spatial distribution of damage for a given seismic hazard using mathematical models created with modelling parameters and acceptance criteria specified in the standard. The seismic performance of a reinforced concrete (RC) frame structure is evaluated using a mathematical model assembled using the modelling parameters for nonlinear dynamic analysis in the ASCE 41-17 standard. The mathematical model includes nonlinearities associated with flexural and shear failure. The seismic hazard consisted of the set of far-fault ground motions in FEMA P695, scaled to the intensity of the MCE ground motion at the building site according to the provisions in FEMA P695. Probabilities of collapse due to lateral and local instabilities are presented as well as probabilities of achieving performance objectives of immediate occupancy, life safety, and collapse prevention.



Biography

Adolfo B Matamoros is the Peter T Flawn Professor in the Department of Civil and Environmental Engineering at the University of Texas at San Antonio, where he joined the Faculty in 2014. Prior to UTSA, he worked for 15 years at the University of Kansas, in Lawrence, KS where he held the titles of Professor, Associate Chair for Undergraduate Studies, and Director of Laboratories. He received his MS, PhD degrees in Civil Engineering from the University of Illinois at Urbana-Champaign in 1994 and 1999, respectively and the Degree of Licenciado (IPB) from the University of Costa Rica, in 1989. He is a Licensed Professional Engineer in the state of Texas and is active in multiple professional organizations including the American Concrete Institute, the American Society of Civil Engineers, and the Earthquake Engineering Research Institute. He has chaired national technical committees such as the joint ACI/ASCE Committee 408 on Bond and Development of Reinforcement, and the ACI 423-445 ad-Hoc Committee on shear/anchorage failure in end regions of prestressed members. He is a Voting Member of ACI Committees 374, Seismic Resistant Design; 341, Earthquake-Resistant Concrete Bridges; 369, Seismic Repair and Rehabilitation, and 445, Shear and Torsion.

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