Palestra Prof. Riyadh Hindi

Professor and Director
Office of Graduate Programs
Parks College of Engineering, Aviation and Technology
Saint Louis University

Dia 04/07 - 14:30
Auditório II da Eng. Química

Investigation of Distortion-Induced Fatigue Cracking in a Seismically-Retrofitted Bridge

Abstract:
Many multi-girder steel bridges built prior to the mid-1980s have details that are susceptible to damage resulting from distortion-induced fatigue at the cross-frame-to-girder connection. The sensitivity of these details depends on a number of parameters including cross-frame geometry and placement, longitudinal girder gusset-plate details, and superstructure boundary conditions, to name a few. This study examines distortion-induced fatigue cracking in one bridge where changes to these parameters were deemed necessary following a seismic review initiated by the Federal Highway Administration (FHWA) in response to the 1989 Loma Prieta Earthquake. Following the review, the bridge was modified using a conventional seismic retrofit strategy to meet the 1995 FHWA standards for survivability and seismic performance. Upon completion of the retrofit, an inspection revealed new cracks in the web-gap region of the interior longitudinal girders occurring at or near the location of the retrofit. This project investigates the influence of the retrofit strategy on distortion-induced fatigue cracking by comparing differential girder deflections and stresses in the web-gap region of the original and retrofitted bridge under live and thermal loading. A three-dimensional finite element analysis of the bridge before and after the retrofit is presented in addition to potential post-retrofit strategies to limit further crack propagation. The results clearly demonstrate the importance of considering fatigue-sensitive details in seismic-retrofit strategies.

Biography:
Dr. Riyadh Hindi is a professor of civil engineering and the associate dean for graduate education and research at Parks college of engineering, aviation and technology at Saint Louis University, MO. He is a registered professional engineer. He is a fellow of the ASCE Structural Engineering Institute (F.SEI). He has worked as a structural and bridge engineer in the US and abroad for more than 25 years. Dr. Hindi's area of expertise includes non-linear behavior, modeling, and damage of reinforced and prestressed concrete elements under static, cyclic and seismic loadings, confinement of reinforced concrete bridge columns, low-cycle fatigue of bridge elements and reinforcement, behavior of bridges under vehicular live load. He has developed a damage model of R/C concrete bridge columns under seismic loading based on degraded energy.