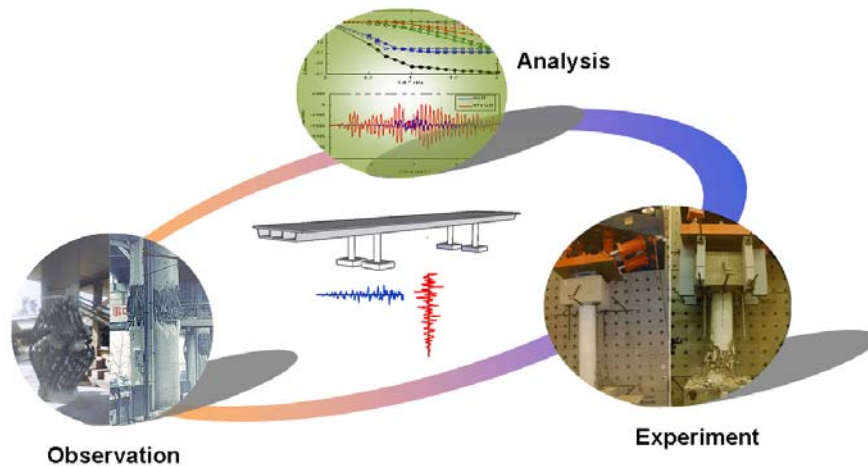


Analytical and Experimental Investigation of the Effect of Vertical Ground Motion on RC Bridge Piers

In the past few decades, horizontal earthquake motion has been studied extensively and considered in the design process. On the other hand, the vertical component of shaking has generally been neglected in design, and rarely studied from the hazard viewpoint. Recent attenuation studies, supported by increasing numbers of near-source records, report that the ratio of peak vertical-to-horizontal ground acceleration can exceed the usually-adopted two thirds. Furthermore, field observations from recent earthquakes have confirmed the destructive effect of vertical ground motion. Therefore, the significance of vertical ground motion has gradually increased among the structural earthquake engineering community.



The presentation gives a summary of a current NEES-R project on multi-axial loading effects on RC bridges, with emphasis on the effect of vertical earthquake ground motion. The very first experimental evidence of the damaging effect of the vertical component of shaking is highlighted, and correlating analytical studies are presented. Wide-ranging parametric studies on RC bridges and buildings are also briefly presented. The presentation also includes an overview of the research programs of the Mid-America Earthquake Center and the NEES@Illinois facility.

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CAREER SUMMARY

Professor Amr Elnashai, Fellow of the Royal Academy of Engineering, is Bill and Elaine Hall Endowed Professor at the Civil and Environmental Engineering Department, University of Illinois. He is Director of the National Science Foundation (NSF) multi-institution multi-disciplinary Mid-America Earthquake Center. He is also Director of the NSF Network for Earthquake Engineering Simulation (NEES) Facility at Illinois, as well as Director and Chair of the College of Engineering 'Council on Global Engineering Initiatives'. A graduate of Cairo University, Amr obtained his MSc and PhD from Imperial College, University of London, UK. Before joining the University of Illinois in June 2001, Amr was Professor of Earthquake Engineering and Head of Section at Imperial College.

He is founder and co-editor of the Journal of Earthquake Engineering, editorial board member of several other journals, a member of the drafting panel of the European and Egyptian design codes, past chairman of the UK earthquake engineering association, UK delegate to and past senior Vice-President of the European Association of Earthquake Engineering. He is the winner of the Imperial College Unwin Prize for the best PhD thesis in Civil and Mechanical Engineering (1984), the Oscar Faber Medal for best paper in the Institution of Structural Engineering, and two best paper medals from the International Association of Tall Buildings, Los Angeles.

Amr is Fellow of the American Society of Civil Engineers and the Institution of Structural Engineers in the UK. He is President of the Asian-Pacific Network (ANCER), a member of the FIB Seismic Design Commission Working Groups and two Applied Technology Council (ATC, USA) technical committees as well as the Illinois State Seismic Safety Task Force. He founded the Japan-UK Seismic Risk Forum in 1995 and served as its director until 2004. He was advisor to the UK Department of the Environment, chairman of a ministerial committee for the assessment of scientific research in Egypt, advisor to the Civil Defense Agency of Italy and review panel member for the Italian Ministry of Research and the New Zealand and Canadian Science Research Councils.

Amr's technical interests are multi-resolution distributed analytical simulations, network analysis, large scale hybrid testing and field investigations of the response of complex networks and structures, on which he has more than 250 research publications, including ~120 refereed journal papers, many conference, keynote and prestige lectures (including the Nathan M. Newmark Distinguished Lecture), research reports, books and book chapters, magazine articles and earthquake field mission reports. Amr has successfully supervised 30 PhD and over 100 Master of Science theses. He has contributed to projects for a number of international companies and other agencies such as the World Bank, GSK, Shell, AstraZeneca, Minorco, British Nuclear Fuels, Nuclear Installations Inspectorate, Mott MacDonald, British Airport Authority, Alstom Power, the Greek, Turkish and Indonesian Governments, Federal Highway Administration, National Geographic Society, US AID, amongst others. He is currently leading a large project for the Federal Emergency Management Agency (FEMA), and State Emergency Management Agencies.