SEISMIC CRACKING AND SLIDING RESPONSE OF GRAVITY DAMS: NUMERICAL ANALYSIS AND EXPERIMENTAL OBSERVATIONS

Abstract: This presentation first provides an overview of historical seismic damage imparted to concrete dams. Structural analysis methodologies based on smeared crack and discrete crack analyses to assess the seismic cracking and sliding responses of concrete gravity dams, related computer programs, and experimental validation work that were developed at École Polytechnique de Montréal (Montréal University), are then presented. Shake table experiments were conducted on 3.4m high concrete gravity dam models to study their dynamic cracking and sliding responses and to compare with finite element simulations based on a nonlinear material constitutive models. The effectiveness of post-tension anchors to improve the seismic stability has been studied from shake table experiments. The transient evolution of uplift pressures in small concrete specimens with opening and closing of cracks in the 2-10 Hz frequency range has been experimentally measured for initial static pressures up to 400 kPa. It was shown that the seismic fluctuations of uplift pressures can be very significant and are a function of the forcing frequency. It is shown that the seismic safety evaluation should be performed using a progressive approach working from the gravity method (pseudo-static and pseudo-dynamic methods), to simple linear elastic FE models, gradually introducing elaborate nonlinear constitutive material (joint) models when significant nonlinear behavior is expected to develop. The presentation ends by giving an overview of the R&D work currently undergoing at École Polytechnique de Montréal related Seismic Water-Fracture Interaction models and Seismic Safety of Gated Spillways.

Short Biography: Pierre Léger is the Co-chair holder of the CRSNG / Hydro-Québec / Alcan chair on structural safety of concrete dams at École Polytechnique de Montréal. He received his Ph.D. in Civil Engineering from the University of California, Berkeley, in 1986 and has years of research and practical experience in numerical analysis, testing, and retrofit and rehabilitation of concrete dams.

DATE: MONDAY, NOVEMBER 8th, 2004
TIME: 3:00 – 4:00 PM (EST)
LOCATION: 140 KETTER HALL, NORTH CAMPUS, UB

FACULTY, STUDENTS & ALL OTHERS ARE INVITED TO ATTEND. For further information please see the UB-EERI webpage: http://wings.buffalo.edu/gsa/EERI or the MCEER SLC webpage: http://mceer.buffalo.edu/slc

Refreshments will be served