ETH zürich

IGT-Kolloquium

Thursday, 17 May 2018

Modeling and Simulation of Earthquakes, Soils, Structures, and their interaction

Prof. Boris Jeremic
University of California, Davis, CA

5 pm, ETH Zurich, Hönggerberg, HIL E4

Presented will be a hierarchical, deterministic and probabilistic approach to numerical modeling and simulation of civil engineering infrastructure objects. Of interest is statics and dynamics of soils and structures, and their interaction during earthquakes. Principal goal is the understanding and reduction of modeling and parametric uncertainty. Modeling uncertainty is introduced in simulation results when simplifying modeling assumptions are made. A hierarchy of models, from simpler, to more sophisticated, is used to understand and control the influence of modeling simplifications on results. Moreover, Stochastic elastic plastic finite elements are used to propagate parametric uncertainty. Parametric uncertainty is the uncertainty in material and load. In addition to analysis of modeling and parametric uncertainty, flow of seismic energy through soils and structures is modeled and simulated as well. Flow of seismic energy through soil and structure can be used to optimize new designs for safety and economy and to improve performance of existing objects.
A number of examples will be used to illustrate modeling and simulation of soil and structure systems with particular application to earthquakes. Overall focus is on modeling and simulation that predict and inform, rather than curve fit.
Presented examples are available for analysis by anyone, using MS ESSI Simulator (http://ms-essi.info/) on Amazon Web Services computers.

Boris Jeremic is a Professor of Civil Engineering at the University of California at Davis, California, and a Faculty Scientist at the Earth and Environmental Sciences Area at the Lawrence Berkeley National Laboratory in Berkeley, California, USA. Professor Jeremic holds a Diploma Civil Engineering degree from the University of Belgrade, and a Master of Science and Doctor of Philosophy degree from the University of Colorado at Boulder. Focus of his work has been on development and use of deterministic and probabilistic numerical methods and tools for modeling and simulation of static and dynamic behavior of civil engineering solids and structures. Professor Jeremic is the principal designer and developer of the MS ESSI (Real ESSI) Simulator system (http://ms-essi.info/). Most recent work is on development of methods and programs for analysis of earthquakes, soils, structures and their interaction and application to nuclear installations.

Institut für Geotechnik