Center for Infrastructure Resilience in Cities as Livable Environments

CIRCLE

Dr. Muneo Hori

CIRCLE
Distinguished Lecture Series

High performance computing and automated model construction for integrated earthquake simulation

ABSTRACT: To improve earthquake preparedness and response, it is desirable to predict earthquake hazards, damage, and response over a wide area with high accuracy and resolution for a given earthquake scenario. Integrated earthquake simulation realizes this prediction by numerically analyzing an entire city. The basic technologies of the integrated earthquake simulation are large-scale numerical analysis using high-performance computation and automatic construction of analytical models using city data. In this lecture, the two basic technologies will be outlined and concrete examples will be presented. As examples of integrated earthquake simulation, the Tokyo metropolitan area earthquake and the Nankai Trough earthquake that will hit the Kansai region will be explained. These two examples include physics-based simulations of earthquake wave propagation and amplification and seismic response of various structures, as well as social science simulations of post-disaster traffic flows and economic activities.

BIO: Prof. Muneo Hori is a Director-General at Research Institute for Value-Added-Information Generation, Japan Agency for Marine-Earth Science and Technology, and a Project Professor at School of Engineering, the University of Tokyo. He also serves as a Program Director for the Cabinet Office of Japan, and a Program Officer at Japan Science and Technology Agency. He obtained his B.S. from the University of Tokyo, and obtained his M.S. and Ph.D. from Northwestern University and University of California, San Diego, respectively. His research interests include computational earthquake engineering with an emphasis on developing large-scale simulation system, as well as applied mechanics and mathematics for deformation and fracture of solid. He has received numerous awards, such as the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Japan, and Award of for Gas Safety and Security by the Ministry of Economy, Trade and Industry, Japan.

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CIRCLE — Center for Infrastructure Resilience in Cities as Livable Environments

Dr. Muneo Hori

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杰 出 讲 座 系 列

用于地震综合模拟的高性能计算和自动化建模

摘要：为了提高地震防备和反应能力，需要以较高的精度和分辨率预测已知地震作用下广泛区域内的地震灾害、损伤情况和地震反应。地震综合模拟可以通过对整个城市的数值分析实现上述预测。地震综合模拟的基本技术是借助高性能计算进行大规模数值分析以及利用城市数据自动建立分析模型。本讲座将介绍这两项基本技术，并以东京都地区地震和关西地区南海海沟地震为例给出具体解释。 两个例子中包括对地震波传播和放大效应、各种结构地震反应的物理学模拟，以及对灾后交通和经济活动的社会科学模拟。

简介：Muneo Hori（堀宗朗）教授任日本海洋–地球科技研究所增值信息创生部门主管、东京大学工程学院特任教授，同时担任日本内阁办公室项目主任和日本科学技术振兴机构项目负责人。他在东京大学获得学士学位，在美国西北大学和加州大学圣地亚哥分校分别获得硕士和博士学位。研究方向包括以开发大规模模拟系统为重点的计算地震工程学，以及固体变形和断裂的应用力学和数学。他获得了许多荣誉，如由日本文部科学部颁发的科学技术奖、日本经济产业部颁发的天然气安全保障奖等。

CIRCLE：宜居城市基础设施韧性中心是伊利诺伊大学厄巴纳–香槟分校（UIUC）格兰杰工程学院和浙江大学（ZJU）建立的三个联合研究中心之一。 CIRCLE 杰出讲座系列旨在为教师和学生提供与该领域国际知名专家会面和互动的机会。

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