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An explicit time-domain approach for random vibration of large complex structures

By

Professor Cheng Su

South China University of Technology, China

Date: Friday, 2nd August 2019

Time: 11.00 am to 12.00 noon

Venue: EA #06-02

**Block EA, 9 Engineering Drive 1,
Singapore 117575**

Faculty of Engineering,

National University of Singapore



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Abstract

Probabilistic evolution mechanism plays an important role in structural random vibration analysis, which is closely associated with the inherent effects of the physical evolution mechanism of the system. Therefore, both sets of mechanism should be considered properly and efficiently in random vibration analysis of structures. In this talk, detailed discussions are presented on how the two sets of mechanism are organized and reflected in different analytical methods, including the spectral evolution methods, moment evolution methods and probability evolution methods as well. Specific attention is paid to the coupling and/or uncoupling treatment regarding the physical mechanism and the probabilistic evolution considered in different methods. It has been observed that the proposed explicit time-domain method (ETDM) is an uncoupling treatment approach and will lead to a real-sense dimensional reduction in terms of degrees of freedoms and time instants involved in random vibration problems. The ETDM has been applied to non-stationary random vibration analysis of linear and nonlinear structures, stochastic sensitivity analysis and optimal design of structures subjected to random excitations, and random vibration analysis of coupled vehicle-bridge systems. Engineering applications to high-rise buildings, long-span bridges, large-scale nuclear power plants and complex vehicle-bridge systems are presented to show the feasibility of ETDM in random vibration problems of large complex structures.

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Speaker Biography

Prof. Cheng Su is a Professor of the School of Civil Engineering and Transportation at the South China University of Technology. He was the Dean of the School of Civil Engineering and Transportation from 2008 to 2017, and is now the Deputy Director of the State Key Laboratory of Subtropical Building Science. Prof. Su has been actively working on wind-induced vibration analysis and seismic analysis of long-span bridges and high-rise buildings, and construction control and health monitoring of large-scale complex structures. He is also engaged in research on random vibration of structures and stochastic computational mechanics. Over 200 publications have been authored or coauthored by Prof. Su along with over 100 presentations. Prof. Su is the recipient of the Frederick Palmer Prize 2010 from the Institution of Civil Engineers, UK. He is currently a member of the Editorial Advisory Board for the Journal of Sound and Vibration.



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*****Seats are limited. Please register early. All are welcome and admission is free*****

Location



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