Oreste S. Bursi

Oreste S. Bursi graduated in Mechanical Engineering at the University of Padua in 1984, and achieved his PhD. in Mechanical Engineering at the University of Bristol. He is Full Professor of Structural Dynamics and Control at the University of Trento. The research activity is mainly devoted to the pseudo-dynamic test method, non-linear dynamics, control and structural identification. *www.ing.unitn.it/~bursi*

Rosario Ceravolo

Rosario Ceravolo received a Laurea degree in Civil Engineering and a PhD in Structural Engineering both from Politecnico di Torino. He is Associate Professor of Earthquake Engineering & Structural Dynamics at the Politecnico di Torino since 2003. Author of 130 technical publications on various subjects, including structural health monitoring, dynamic identification and seismic isolation.

Shirley J. Dyke

Shirley Dyke earned her bachelors degree from the University of Illinois and her PhD from the University of Notre Dame. She comes from Washington University-St. Louis, where she was Professor of Engineering and director of the Structural Control and Earthquake Engineering Lab. Dyke is Professor of Mechanical and Civil Engineering at Purdue University and investigates ways to reduce losses and property damage from earthquakes. She also studies structural control and

monitoring systems for improving the behavior and lifetime of structural systems.

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University of Trento

Doctoral School in Civil, Environmental and Mechanical Engineering

UNIVERSITÀ DEGLI STUDI DI TRENTO

Identification and control techniques for real-time hybrid simulations

Course offered by **prof. Oreste S. Bursi**, University of Trento, **prof. Rosario Ceravolo**, Politecnico di Torino and **prof. Shirley J. Dyke**, Purdue University.
June 18-20, 2014.
Department of Civil, Env. and Mechanical Eng. University of Trento.

Course objective

The scope of the course is to provide knowledge of identification and experimental techniques used to characterize the hysteretic behaviour of mechanical/structural systems subjected to dynamic/earthquake loading. Some numerical methods and elements of advanced identification and control exploited in modern mechanical engineering are proposed.

Who should attend

Graduate students in engineering interested in linear/non-linear structural dynamics and control, and researchers, in modern mechanical/structural engineering.

Course outine

Fundamentals of system identification and applications to mechanical/civil structures. Fundamentals of vibration-based structural health monitoring. Concepts of signal analysis. Experimental modal analysis. Identification in frequency, time and time-frequency domain. Non-linear and hysteretic system identification. Experimental modal analysis: numerical examples and applications to civil structures.

Time integration of non-linear dynamic equations. Elements of Control Engineering. Solution of algebraic equations via quasi-Newton and secant methods. Non-linear time history analysis. Discrete Fourier transform; Z-transform. Elements of control for actuation.

Real-time Hybrid Simulation in USA. Impact on Civil Engineering Practice. Effort made by NEES. Stability, performance and Execution of a Real time hybrid simulations.

Real-time Hybrid Simulation in Europe. Model reduction. Model updating. Case studies in mechanical and civil engineering. Visit to the Structural Laboratory LPMS @UNITN.

Suggested readings.

-Modern Testing Techniques for Structural Systems -Dynamics and Control, O.S. Bursi and D.J. Wagg ed., CISM- SpringerWien NewYork.
-Ceravolo R. (2009) Chapter 26: Time-Frequency Analysis. In: Encyclopedia of Structural Health Monitoring / BOLLER; CHANG AND FUJINO EDS. Wiley, CHICHESTER, pp. 503-524.
-Dyke J.S. et al., Hybrid Simulation Primer and Dictionary. George E. Brown, Jr. Network for Earthquake Engineering Simulation, National Science Foundation, 2014.

Course schedule

Wednesday, June 18, 2014
H1 Room
9.00-13.00
14.30-18.00
Thursday, June 19, 2014
H1 Room
9.00-13.00
14.30-18.00
Friday, May 20, 2014
H1 Room
9.00-13.00
14.30-17.00

Information

The course is free of charge.
For further information, contact Marina Rogato. DICAM and Secretariat of the Doctoral School. Tel. 0039 0461 282611,
Fax 0039 0461 282672
marina.rogato@unitn.it

Course schedule

Wednesday 18/06
All day Oreste S. Bursi
Lab visit included.

Thursday 19/06
- 9-11 Rosario Ceravolo
- 11-12.15 Shirley Dyke
- 14-16 Oreste S. Bursi
- 16-18 Rosario Ceravolo - Lab

Friday 20/06
- 9-10.15 Shirley Dyke
- 10.30-13.00 Rosario Ceravolo
- 14-16 Rosario Ceravolo - Lab
- 16-18 Oreste S. Bursi