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. URL: *www.ing.unitn.it/~bursi*

Nicola Tondini

Nicola Tondini received his PhD in Structural Engineering at the University of Trento in 2009. He is currently Assistant Professor at the Department of Civil, Environmental and Mechanical Engineering at the University of Trento. His research interests mainly involve the behaviour of structures subjected to fire, both experimentally and numerically, with emphasis on the development of advanced computations methods.

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University of Trento

Doctoral School in Civil, Environmental and Mechanical Engineering

UNIVERSITÀ DEGLI STUDI DI TRENTO

Nonlinear analysis for Dynamic and Thermo-mechanical problems

Course offered by **Prof. Oreste S. Bursi**, University of Trento and **Dr. Nicola Tondini**, University of Trento.
November 27-28, 2014.
Department of Civil, Env. and Mechanical Eng. University of Trento.

Course objective

The scope of the course is to provide knowledge of nonlinear analysis of dynamic problems as well as of thermo-mechanical problems solved by means of Finite Element techniques. As regards thermo-mechanical problems, basic theoretical formulation of FE thermoelasticity will be highlighted. FE thermo-mechanical examples including plasticity models in the context of structural engineering applications will be presented. Example of a weak coupling between a Computational Fluid-Dynamics (CFD) software and an FE software will be also provided.

Who should attend

Graduate students in engineering interested in nonlinear structural dynamics and in thermo-mechanical problems, and researchers, in modern mechanical/structural engineering.

Course outline

Fundamentals of FE thermo-mechanical problems applied to structural engineering. Basic concepts of the FE method. Formulation of a FE thermoelastic problem. Example of the thermo-mechanical FE code SAFIR that implements plasticity models. Case studies of structures subjected to fire.

Implementation of an integrated modelling strategy between a CFD software and an FE software. General formulation of a full CFD-FE coupling approach. Assumptions and simplifications of a weak coupling approach. Examples of weak coupling approach applied to structures subjected to fire.

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- Springer Wien NewYork.
- R.B. Hetnarski; M. Reza Eslami Thermal Stresses – Advanced Theory and Applications, springer, 2008.
- O.C. Zienkiewicz, R.L. Taylor and J.Z. Zhu, The Finite Element Method – Its Basis & Fundamentals, 6th Edition, Elsevier, 2008.
- *Tondini N., Vassart O. and Franssen J.-M. (2012) Development of an interface between CFD and FE software. Proceedings of the 7th Conference on Structures in Fire, Zurich, Switzerland, 6-8 June.*
- *Franssen J.-M. (2005) SAFIR. A Thermal/Structural Program Modelling Structures under Fire, , Engineering Journal, A.I.S.C., Vol 42, No. 3, 143-158*

Course schedule

Thursday, November 27, 2014
H1 Room
14.00-18.00
Friday, November 28, 2014
H1 Room
9.00-13.00

Information

The course is free of charge.
For further information, contact

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