Announcement

Laboratory of Civil Engineering at Tampere University of Technology is organizing an intensive postgraduate course on nonlinear computational mechanics.

Adnan Ibrahimbegovic is Professor Classe Exceptionnelle and Chair for Computational Mechanics at University of Technology Compiègne, a founding member of Sorbonne Universités (along with Paris-Sorbonne, Université Pierre Marie Curie and INSEAD). He is also Senior Member of IUF-Institut Universitaire France (equivalent to Academy Professor in Finland, reserved for 1% French professors in all scientific disciplines, including very few in engineering). He has obtained his engineering education in Sarajevo, PhD at the University of California Berkeley, USA and Habilitation at University Pierre Marie Curie in Paris, France. He has held professorships and research positions at four different universities (including UC Berkeley, USA; EPFL, Switzerland; ENS-Cachan, France and currently UTC, France). He is the past Chairman of ENS-Cachan Teaching and LMT-Cachan Research Departments and Head of Master Program MaiSE. He has received a number of international distinctions, including IACM Fellow Award, Humboldt Research Award for Germany, Research Award for Slovenia, International Fellow NSERC Award for Canada, ‘Claude Levy-Strauss’ Chair for Univ. Sao Paulo, Brazil, ‘Asgard’ Chair for NTNU, Norway, KAIST Invited Professor, South Korea, ‘Hôte Académique’ Award for EPFL, Switzerland. He has produced more than 550 publications, including 180 papers in scientific journals and 8 textbooks and monographs.

Inquiries about the course can be directed to Reijo Kouhia tel: +358 40 8490561, e-mail: reijo.kouhia@tut.fi. Registrations for the course via https://www.webropolsurveys.com/S/59864417204225E.par

Website
http://www.tut.fi/rakmek/PhD_course_2018/

Course program

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Content

1. Introduction: variational formulations in nonlinear solid mechanics
2. FEM technology for 2D/3D BVP in elasticity
3. Inelastic constitutive behavior at small strains
4. Advanced constitutive models
5. Nonlinear solid mechanics at large strains
6. Instability of structures and materials
7. Advanced aspects of multi-scale problems
8. Multi-physics, coupled and interaction problems
Course objectives

The main objective of this course is to provide engineers who use computer codes, graduate students, and researchers with an extensive review of FE based numerical models and solution algorithms for nonlinear mechanics. It presents the current state-of-the-art in finite element modeling of nonlinear problems in solid and structural mechanics, and their coupling with thermal fields. It will illustrate the difficulties (and their solutions), which appear in a number of applications from mechanical, aerospace or civil engineering and material science. All the sources of nonlinear behavior are present in a systematic manner, related to kinematics, equilibrium, constitutive equations, or boundary and coupling conditions. Special attention is paid to dealing with a class of problems with nonlinear constitutive behavior of materials, large deformations and rotations of structures and instability problems with either material (localization) or geometric (buckling) nonlinearities, which are needed to fully grasp any weakness of a particular structural design near the ultimate limit state. In addition, multi-physics models will be addressed, with a special emphasis of thermal coupling and fluid-structure interaction.

The course will also provide insight into the practical aspects of the Finite Element Method, related to making the choice of a particular element type, the constitutive model, or integration scheme among those available in advanced computer codes. Our second objective is thus to provide the participants with a solid basis for using the FEM based models and software in trying to achieve the optimal design, and/or to carry out a refined analysis of nonlinear behavior of structures or multibody systems. The course finally provides a basis to account for any pertinent multi-physics and multi-scale effects, which are likely to achieve a significant break-through in a number of industrial applications.

Participants

The course is suitable for all engineers and researchers who would like to improve their skills with using a refined modeling approach in nonlinear mechanics. In particular, those who are developing their own tools (with an illustration of the research code CO-FEAP), and those who seek to make a more efficient use of existing codes will find the course very helpful. Moreover, all those who would like to reinforce their understanding of the theoretical basis of problems in nonlinear mechanics and an illustration of current research in Computational Mechanics will be well served through the course notes and the course books*. This course (in a somewhat reduced format) has already been held several times since 2000 in France, in Germany and in Italy, and has proved very successful. Among the previous participants, those with background in engineering or applied mathematics, as well as those with previous knowledge of basic FEM procedures for linear problems, found the course most profitable. The participants are assumed to have a background in continuum and structural mechanics. Some background in the finite element method is also desirable.

Course materials

The course material will consist of copies of transparencies from the lectures, survey papers by the lecturers, recent manuscripts and lecture notes. Also, a copy of the course textbook will be offered for purchase to participants at the student discount rate of 50 Euros.


Requirements and credits (ECTS)

Attending lectures and successful completion of home exercises will give 5 credit points.

Further information

The lectures will be given in the Rakennustalo building, Korkeakoulunkatu 6, Tampere (Number 5 in the map below). Two lectures are in Festia building (number 8) and one in Konetalo (number 6).

Up to date information available at:
http://www.tut.fi/rakmek/PhD_course_2018/

Arriving to Hervanta

Buses 3 and 20 from Tampere Railway station.

Journey planner
http://reittiopas.tampere.fi/en/