The Department of Structural Engineering and Building Technology at Helsinki University of Technology is organising an intensive postgraduate course on large strain plasticity. The course is a part of the program of the National Graduate School in Engineering Mechanics.
The course will be lectured by professor Matti Ristinmaa from Lund University. The lectures will be given in the Auditorium R2 in the Department of Structural Engineering and Building Technology, address: Rakentajanaukio 4A, Espoo).

All the inquiries can be directed to Reijo Kouhia tel: +358 (0)9 4513755, or email: Reijo.Kouhia@tkk.fi. Registrations for the course will be taken care by the secretary Elsa Nissinen-Narbro tel: +358 (0)9 4513701, or fax: +358 (0)9 4513826, or email: Elsa.Nissinen@tkk.fi,

If accommodation services are needed, please, ask for the information from the secretary.

Course program

Monday 19th May 2008,
Lecture 9.15-12.00
Large strain kinematics,
strain tensors.

Tuesday 20th May 2008,
Lecture 9.15-12.00
Stress tensors, virtual work.

Wednesday 21st May 2008,
Lecture 9.15-12.00
Introduction into large strain plasticity.
Anisotropy at large strains.

Thursday 22nd May 2008,
Lecture 9.15-12.00
Thermodynamics.
Coupled problems in large strains.

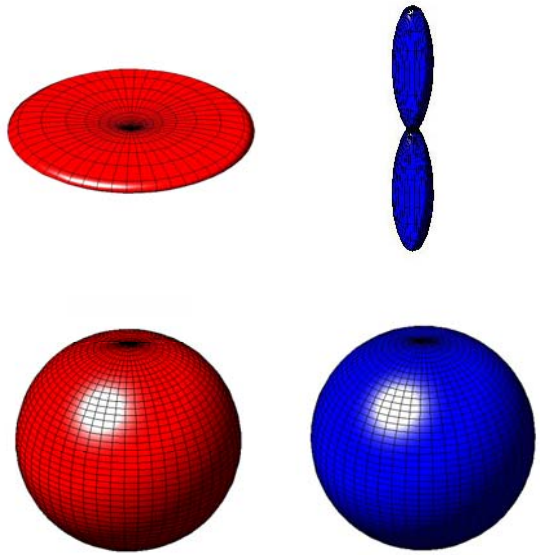
Friday 23rd May 2008,
Lecture 9.15-12.00
Numerical treatment of large strain problems

Department of Structural Engineering and Building Technology
Helsinki University of Technology

Ph.D. course
Graduate school of Engineering Mechanics

Large strain plasticity

19th – 23rd May, 2008



A course given by

Matti Ristinmaa

Division of Solid Mechanics
Lund University

Background

Understanding the elastoplastic deformation of materials, including the constitutive description and analysis of structures undergoing plastic deformation, is essential for mechanical, civil and geotechnical engineers, as well as materials scientists.

The literature on large strain plasticity theory is very extensive. Indeed, the formulation of a consistent large strain plasticity theory that also contains physically appealing features (a physically acceptable stress tensor in the yield criteria, for instance) is not trivial. This is reflected in the many recent papers on the subject that just underlines that, today, the large strain plasticity theory is still under development. This is in contrast with the situation for small strain plasticity theory where the community agrees upon the theory.

The aim of the course is to provide a modern introduction to the contemporary theories of large strain plasticity including rudiments of non-linear continuum mechanics comprising various strain and stress measures and the objectivity principle. Apart from the usual Newtonian mechanics, thermodynamics provides a fundamental basis as it is viewed as expressions for laws of nature. Emphasis is given to large strain plasticity theories which fit into the thermodynamic framework.

Study material

Will be provided later.

Suggested reading

L.E. Malvern: *Introduction to the Mechanics of a Continuous Medium,* Chapters 4-6
J. Lubliner: *Plasticity Theory,* Chapter 8.

Participants

The participants are assumed to have a background in continuum and structural mechanics. Some background in the finite element method is also desirable.

Requirements

Home exercises, examination.

Credits (ECTS)

Attending lectures and successful completion of home exercises will give 3 credit points. Passed examination will give additional 2 credit points.

Further information

The lectures will be given in the Auditorium R2 in the Department of Structural Engineering and Building Technology, Rakentajanaukio 4A, Espoo. (Number 4 in the map below).
Up to date information available at:
http://www.tkk.fi/Units/Civil/StructuralMechanics/actual.html

Arriving to Otaniemi

Buses from the centre of Helsinki
102, 102T,103 (Line T via Lauttasaari)
194,195 via Munkkiniemi

From the centre of Tapiola
2,4,4T,10,15,52,194,195,505,510,512,550

Bus 103 stops at the library (24) on Otaniementie and both 194 and 195 stops opposite the library on Vuorimiehentie. Bus 102 stops on Otaniementie and Otakaari.

Aikataulut/Timetables http://www.ytv.fi/