FAF3901. Advanced Rheology of Bituminous Materials (7.5 hp)

Content and Objectives

The purpose of this course is to give engineers, scientists and researchers a deeper insight into the rheology of the bituminous materials with an emphasis on methodologies and applications for research problems. The fundamental theoretical background, the experimental techniques and modelling strategies will be treated. Practical implications of recent research developments will be stressed.

Aims

The aim of the course is to give knowledge on:

- Phenomenology of the flow behavior of bituminous materials
- Linear and nonlinear viscoelasticity
- Thermomechanics
- Viscoplasticity
- Viscoplastic, viscoelastoplastic and viscoelastic continuum damage theory
- Fatigue, thermal cracking
- X-Ray CT and image-based modelling
- Experimental characterization and determination of mechanical properties of binder and asphalt mixtures

Prerequisites

- Academic degree in civil engineering.
- Passed courses in basic pavement engineering.

Attendance

- Graduate students, teachers and researchers in structural engineering.
- Practicing highway engineers, wanting to learn more about the rheology of bituminous materials.

Organisation

The course will be held at KTH, Department of Civil and Architectural Engineering, Brinellvägen 23, Stockholm, Sweden.

The main part of the course will be given between 9th and 13th of May 2016 and the final course seminar will be organized on September 6th. Apart from the scheduled teaching, the participants are expected to do independent homework in the form of analytical problem solving, computer based exercises and project work.

Registration

Registration for the course should be made not later than April 20th, 2016 by e-mail to denis.jelagin@abe.kth.se. Please indicate name, address, phone, e-mail address and affiliation.

Registration fee is 15000 SEK (free for PhD-students registered at one of the four technical universities within the Sveriges Bygguniversitet (SBU), and 5000 SEK for PhD-students from other universities).

Teaching

Responsible teaching staff and lecturers are:

- Adj. Prof. Manfred Partl, KTH & EMPA
- Assoc. Prof., Denis Jelagin, KTH
- Ph.D., Alvaro Guarin, KTH

Examination

The course corresponds to 7,5 ECTS credits. To pass the course the student must complete two homeworks and a project task. Project report should also be presented on the seminar. At least 80 % participation on the course is required.

Contact

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Program

Date	Time	Room	Teacher	Curriculum
Monday, 9th May	13.15-16.00		Manfred Partl	Phenomenology of the flow behavior. Creep and Relaxation.
Tuesday, 10th May	9.15-12.00		Manfred Partl	Boltzmann superposition, time temperature superposition. Static and dynamic loading.
Wednesday, 11th May	9.15-12.00		Manfred Partl Denis Jelagin	Nonlinear viscoelasticity, viscoplasticity and thermomechanics. Viscoelastic, viscoplastic and viscoelastoplastic continuum damage models.
Wednesday, 11th May	13.15-15.00			Low temperature fracture of asphalt mixtures
Thursday, 12th May	9.15-12, 13.15-15.00		Manfred Partl Denis Jelagin	Determination of mechanical properties of bituminous binder and asphalt mixtures.
Friday, 13th May	9.15-12, 13.15-16.00		Alvaro Guarin Denis Jelagin Ibrahim Onifade	X-Ray CT of asphaltic materials, Digital image analysis, Image-based modeling.
Tuesday, 6th September	9-12, 13-15		Manfred Partl Denis Jelagin	Seminar