Thermodynamics of continuous media
Application to thermoplasticity

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The purpose is to present basic concepts of continuum mechanics and of thermodynamics for irreversible processes in continuous media. Taking advantage of the presented tools, several models of thermo-elastoplasticity will be formulated.

COURSE PROGRAM

Monday, 8 April 2019, 16h00 - 18h00

Lecture 1: **Basic concepts**

Continuum mechanics: basic concepts. Some mechanical material responses. Thermodynamics of irreversible processes: the 1st principle (energy balance), the 2nd principle, Clausius-Duhem inequality.

Monday, 15 April 2019, 16h00 - 18h00

Lecture 2: Generalized Standard Materials

Framework of Generalized Standard Materials: a general methodology for the formulation of constitute laws. Free Energy and state laws. Pseudo potential of dissipation, evolution equations. Illustration by simple rheological models.

Thursday, 18 April 2019, 16h00 - 18h00

Lecture 3: **3D perfect elastoplasticity**

Formulation of 3D perfect elastoplasticity. An example of solution for an elastoplasticity problem. Elastoplasticity with isotropic and/or hardening features. Brief comments on elasto-viscoplasticity.

Monday, 29 April 2019, 16h00 - 18h00

Lecture 4: **Plasticity of porous materials**

Limit Analysis approach for porous materials. The Gurson model and its standard extension. Recent applications to failure under shear dominated loadings.

Reference contact

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COURSE LOCATION

meeting room, 2nd floor side A, building *Civil Engineering*
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