Institute of Thermomechanics Seminar
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Lecture
No. 39

Czech Society for Mechanics
and Institute of Thermomechanics, CAS

invite you to a lecture and discussion within
the lecture series **Institute of Thermomechanics Seminar**

Modelling of yield surface distortion in the finite strain range

given by

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The talk is devoted to the phenomenological modelling of the stress response of metallic materials subjected to non-proportional loading conditions. As a preliminary step, a class of two-dimensional rheological models is introduced, capable of capturing the initial and strain-induced anisotropies of the analyzed material. The rheological models mimic the effect of a combined isotropic-kinematic-distortional hardening; the essential part of the approach is a direction-dependent friction element, which allows us to describe an arbitrary sharpening of the yield surface in the loading direction, accompanied by arbitrary flattening on the opposite side. Two different specific definitions of the direction-dependent friction are provided. The first approach is based on a certain interpolation between the initial yield surface of the von Mises type and a fully saturated yield surface exhibiting maximum distortion. The second approach allows interpolating between a sequence of pre-defined symmetric yield surfaces. Both approaches are practical and flexible. They guarantee that the yield surface remains convex and smooth at any stage of the deformation process, which is important for stable and robust computations. Next, basing on these results, a system of constitutive equations is constructed for a general multiaxial loading. The description of the finite strain kinematics is based on the nested multiplicative split of the deformation gradient. The resulting model is objective, thermodynamically consistent, w-invariant; it is free from shear stress oscillations. Finally, an efficient and robust numerical implementation of the model is discussed.
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The lecture will be held on Wednesday, November 15, 2017 at 10:00 in the building of the Institute of Thermodynamics (lecture room B), Dolejškova 5, 182 00 Prague 8

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