SM12L_10265

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

# Material Instabilites in Thermo-Mechanical Processes

**Ahmed Benallal**[(1)], Davide Bigoni[(2)]

(1) *LMT-Cachan, ENS de Cachan/CNRS/Université Paris, Cachan, France*
(2) *Dipartimento di Ingegneria Meccanica e Strutturale, Universitf di Trento, Trento, Italy*

Strain localization and the developement of material instabilities are investigated to highlight the roles of thermal effects and thermomechanical couplings. During a loading process, it is shown that two conditions play the essential roles and correspond to the singularity of the isothermal and the adiabatic acoustic tensors. Under quasi-static conditions, strain localization (in a classical sense) may occur when either of these two conditions is met. It involves a jump in temperature rate in the latter case, whereas temperature rate remains continuous in the former, but a discontinuity in the spatial derivatives of the heat flux must occur.This is consistent with the condition of stationarity of acceleration waves, which are shown to be homothermal and propagate with a velocity related to the eigenvalues of the isothermal acoustic tensor. A linear perturbation analysis further clarifies the above findings.

View the extended summary