



## Book of Abstracts



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## Thermomechanical couplings in solid materials - introduction to theory, experiment and some examples of applications

*Sprężenia termomechaniczne w ciałach stałych - wprowadzenie do teorii, badania doświadczalne i przykłady zastosowań*

**Elżbieta A. Pieczyska**

*Department of Mechanical Engineering,  
Institute of Fundamental Technological Research of the Polish Academy of Sciences,  
A. Pawińskiego 5b, 02-106 Warsaw, epiecz@ippt.pan.pl*

The main objective of the paper is the presentation of thermomechanical couplings in solid materials that embraces some theory, experiments as well as applications. Valuable information on materials can be obtained from detailed analysis of the effects of thermomechanical couplings, i.e. the mechanical and thermal data, captured during the loading and deformation process. It will be explained in frames of the presentation what do we mean by thermomechanical couplings and what are their origins.

On one hand - coupling mechanisms, i.e. thermoelasticity, entropic elasticity, phase transition; on the other hand, mechanical dissipation, associated with plasticity, viscosity and damage. They are related to irreversibility and heat diffusion that are leading to material degradation, developing via micro/macro voids, shear bands and micro shear bands.

The stress-strain characteristics are obtained by high quality testing machine, whereas the temperature changes are obtained by using fast and sensitive infrared camera. The stress-strain and the related temperature characteristics obtained during the loading enables distinguishing deformation process into 3 stages: elastic, plastic and damage. Effects of thermomechanical coupling recorded in Shape Memory Alloys and Shape Memory Polymers will be discussed. Infrared camera is very useful tool in new materials study.

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