Universidad Carlos III de Madrid

Seminario del Instituto Gregorio Millán

Mathematical modeling of rate independent hysteresis and criticality in martensites

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Abstract

We show that singular dissipative potential describing rate-independent plasticity in shape memory alloys can be obtained by homogenization of a micro-model with quadratic (viscous) dissipation. The essential ingredient making this reduction possible is a rugged energy landscape at the micro-scale, generating under external loading a regular cascade of subcritical bifurcations. The rate-independent plastic deformation emerges in this description as a continuous succession of infinitesimal viscous events; the limiting procedure presumes the elimination of small time and length scales. Our prototypical model reproduces most of the experimental observations in martensites including self organization to criticality and power law acoustic emission. Criticality is currently attracting a great deal of interest due to its ubiquity in nature from turbulence to earthquakes. Our explanation of the emergence of criticality in martensites is based on the idea that the disorder needed for criticality is not quenched but is acquired by the system in the process of cyclic deformation.

- DÍA Y HORA: **Miércoles, 7 de abril de 2010** a las **12:30**
- LUGAR: **Edificio Sabatini. Aula 2.1.D04**