UNIVERSITÀ DEGLI STUDI DI TRENTO
Dipartimento di Ingegneria Civile, Ambientale e Meccanica

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AVVISO DI CORSO

Si comunica che **mercoledì 03 e giovedì 04 Ottobre a partire dalle ore 16** si terrà presso l'aula **Q2** (via Mesiano 77) il seguente corso

Internal length scales in mechanics of metallic materials

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One of current research topics in the mechanics of metallic materials at the micron scale is the study of size effects. In those investigations, internal length scales are introduced into material models and used in combination with different external dimensions of a material sample, grain or deformation zone. Of particular interest are internal length scales that possess physical meaning and are linked to the microstructure of the material. It can bring a new insight into the size-dependent relation between microstructural changes and overall mechanical properties, which is of primary importance for developing new materials of superior properties. This course consists of four lectures aimed at presenting selected approaches to introducing internal length scales in the mechanics of materials.

In the first approach, illustrated by martensitic microstructures in shape memory alloys undergoing phase transformation, the internal length scale is determined by the incremental energy minimization that includes the interfacial energy on different scales. It makes the microstructures size-dependent, and the related size effects are studied using the sharp-interface approach.

In the second approach, illustrated by microstructures calculated using the phase-field method, another intrinsic length scale appears that is related to the physical thickness of an interface. In this approach, a phase boundary is treated as a diffuse interface and is described using an order parameter that is spatially continuous.

In the third approach, illustrated by the characteristic wavelength of dislocation patterns in metal crystals subjected to plastic deformation, a natural length scale is derived in the gradient plasticity framework from phenomenological laws of plasticity of metals. The quantitative agreement between the predicted and observed indentation size effects has been studied.

In the fourth approach, energetic or dissipative length scales are used in combination with the above natural length scale. The interplay between the length-scales of physically different origin is illustrated by the examples of monotonic and cyclic deformation of single crystals. The energy approach to the phenomenon of deformation banding in metals is presented and discussed.

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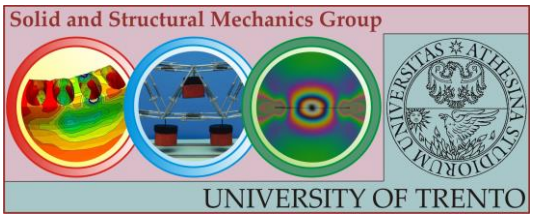
Tutti gli interessati sono invitati a partecipare.

Il corso è organizzato dal gruppo di Scienza delle Costruzioni
(D. Bigoni, L. Deseri, N.Pugno, A. Piccolroaz, F. Dal Corso, M.F. Pantano, R. Springhetti, D. Misseroni)



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