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

Modelling and optimal design of ceramic structures with defects and imperfect interfaces

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MARIE CURIE ACTIONS
PEOPLE

AVVISO DI SEMINARIO

Si comunica che **giovedì 21 novembre a partire dalle ore 15.45**
presso l'aula **R2** (via Mesiano 77) si terrà il seguente seminario

Contact Problems in Micro-Structured Materials

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Indentation tests have long been a standard method for material characterization due to the fact that they provide an easy, inexpensive, non-destructive and objective method of evaluating basic properties from small volumes of materials. As the contact scales, in such experiments, reduce progressively (micro- to nano-scales), internal material lengths become important and their effect upon the macroscopic response cannot be ignored. Thus, the microstructural characteristics of such materials have to be incorporated into the modeling for an accurate representation.

A number of indentation/contact problems regarding micro-structured materials are presented and two alternative modelling strategies are adopted. First, the microstructural characteristics of the indented material are explicitly incorporated in the model where for example a composite material may be treated as distinct perfectly bonded layers of fibers and matrix. Then, to a second approach the microstructural characteristics of the indented material can be "smeared-out" by treating the indented material as a continuum governed by a generalized continuum theory capable of bearing couple stresses.

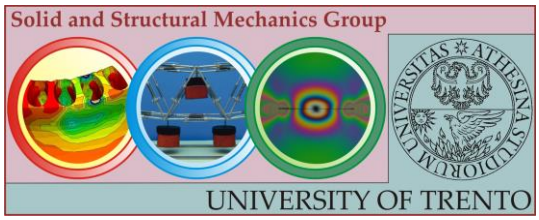
The first modelling strategy, which is approached with the use of the Finite Element Method, offers the advantage that it can incorporate the geometrical aspects of the model in an explicit manner, thus giving a very detailed representation of the material and its structure under investigation. Results are presented within the framework of classical elasto-plasticity.

The second modelling strategy, offers a more efficient approach, however less detailed, and the contact problems are tackled within the framework of the standard couple-stress theory (or Cosserat theory with constrained rotations) which is the simplest theory of elasticity in which couple-stresses arise. The solution is based on singular integral equations which resulted from a treatment of the mixed boundary value problems via integral transforms and generalized functions.

The results show significant departure from the predictions of the models where no micro-structural characteristics are incorporated and it thus seems inadequate to analyze indentation problems in micro-structured complex materials employing only classical contact mechanics.

Tutti gli interessati sono invitati a partecipare.

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



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