

Avviso di seminario

Studies of micromechanics of fracture

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Abstract:

The lecture will cover a number of topics that the author has worked on recently. In ductile fracture some full 3D numerical analyses have been carried out to study crack growth in a material with two populations of voids, and to study the strength of a weld. For friction stir welds an extension of the standard Gurson model has been used to model the strength. The mechanism of cavitation instabilities will be discussed on the basis of a number of different studies. In practice this mechanism is important when plastic flow occurs under highly constrained conditions, such as in metal-ceramic systems. The discussion will include effects of strain gradient plasticity in the metal surrounding the cavity, or of porosity. Crack growth through a discretely represented pattern of holes has been analyzed for two different cases. In one case the holes are voids that grow very large until coalescence with neighbouring voids results in crack extension. Remeshing is necessary in this study to resolve the huge strains involved in the necking of ligaments. Another set of analyses consider crack growth along an interface of patterned wafer-level Cu-Cu bonds. Here the crack growth is modeled by application of a cohesive zone law, but it is found that the crack growth resistance depends strongly on the patterns of the thin Cu layers.

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