Interfacial Mechanics and the Modeling of Contact and Fracture

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Abstract

Fracture initiation and propagation are intimitely connected with the formation of material interfaces that, in classical models of fracture, are idealized as submanifolds of a material body of co-dimension one separating distinct bulk material phases. However, "real" material interfaces are thin domains with complicated thermomechanical properties that are difficult to model and measure. A modeling strategy attributed to Gibbs views material interfaces as "dividing surfaces" endowed with "excess" thermomechanical properties (e.g. mass, internal energy, entropy, stress, strain) that are subjected to constitutive models distinct from the adjoining bulk material phases. This talk gives a survey of recent progress in developing constitutive models for material interfaces viewed as dividing surfaces and the regularizing effect they can have when incorporated into classical models of contact and brittle fracture.