

Toughening in heterogeneous materials

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ABSTRACT

It has been established that contrast in the elastic properties can lead to enhancement of fracture toughness in heterogeneous materials [Hossain et al., 2014]. In this talk, I will focus on layered materials as a model system, and show that this enhancement is a result of two distinct phenomena: fluctuations in stress leading to regions where the stress intensity at the crack is considerably smaller than that of the macroscopically applied value and renucleation when crack tip reach a compliant to stiff interface [Hsueh et al., 2018] Time permitting, I will then focus on “fracture diodes”: microstructured materials with high directional anisotropy in fracture toughness designed by leveraging the aforementioned works [Brodnik et al., 2019].

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