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Crack-Like and Pulse-Like Modes of Frictional Sliding along an Interface Under Dynamic Shear Loading

Demirkan Coker[(1)], Alan Needleman[(1)], Ares J. Rosakis[(2)]

(1) *Brown University, Division of Engineering, Providence, USA*
(2) *California Institute of Technology, Pasadena, USA*

Frictional sliding along an interface between elastic solids under impact shear loading conditions is analyzed numerically. The configuration analyzed consists of two plates of the same material connected along a planar interface. The plates are characterized as isotropic elastic materials and the interface is characterized by a rate- and state-dependent frictional law that also accounts for dependence on normal stress variations. Calculations are carried out for various characterizations of the frictional response and for various impact velocities. Two modes of sliding are observed: a pulse-like mode where the slipping at a point on the interface is of short duration and a crack-like mode where the duration of slipping is much longer. The dependence of these sliding modes on the initial compressive stress, the impact velocity and the friction parameters is explored. The convergence of the numerical results is also considered.

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