

Senza nome

On the slip weakening dependence in Rate and State Dependent Constitutive Law

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Abstract

We study the dynamic propagation of a 2D in-plane crack using a finite difference approach to compare slip weakening and rate- and state-dependent constitutive laws for equivalent sets of initial parameters. Our modeling results confirm that the dynamic solution obtained by using a rate- and state-dependent law implies a slip dependence of the dynamic traction. The shape of the resulting slip weakening curve displays a slip hardening phase preceding the traction drop (weakening phase) and an equivalent critical slip weakening distance (D_o^{eq}). In these simulations the characteristic length for scaling the dynamic parameters is the distance L , which controls the state variable evolution. This implies that the nucleation patch depends on L and not on D_o^{eq} . We show that the adopted constitutive parameters A , B and L control the traction dependence of slip, since D_o^{eq} , the weakening rate as well as the slip-hardening phase depend on these constitutive parameters.