

Title: Lattice model of a fracture in a composite infinite strip

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Abstract:

A discrete two-dimensional square-cell lattice with a steady propagating crack is considered. The lattice particles of two kinds are connected by massless bonds so as to form a two-layer composite infinite strip. The crack is assumed to propagate along the interface between the two layers of the strip subject to prescribed displacements on its edges. The anti-plane fracture is assumed. The problem is reduced to a vector Riemann-Hilbert problem, which is solved analytically by using the Wiener-Hopf factorization for the diagonal elements of the matrix-coefficient with subsequent reducing the problem to a system of linear equations. The solution is analysed to determine the crack stability in the intersonic speed range (that is, between shear wave speeds of the corresponding layers).

Keywords: composite materials, fracture mechanics, lattice model, vector Riemann-Hilbert problem, Wiener-Hopf technique.