Mykhas’kiv, V.; Zhbadynskyi, I.; Zhang, Ch.
Elastodynamic analysis of multiple crack problem in 3-D bi-materials by a BEM. (English)
Zbl 1428.74193

Summary: The three-dimensional (3-D) problem of bi-materials or two ideally bonded elastic half-spaces
with interacting sub-interface cracks subjected to time-harmonic loading is analyzed. The boundary value
problem is reduced to a system of boundary integral equations (BIEs) in the frequency domain for the
crack-opening-displacements (CODs) only. Boundary integrals over the finite crack-surfaces are obtained
by introducing modified elastodynamic Green’s functions, which identically satisfy the contact conditions
on the infinite interface. The singularity subtraction technique under consideration of the ‘square-root’
behavior of the CODs at the crack-front is applied for the regularization of the BIEs. By using a collocation
scheme, the BIEs are converted into a system of linear algebraic equations. Numerical calculations are
performed for a bi-material with two penny-shaped cracks located on both sides of the interface subjected
to time-harmonic tensile loading of constant amplitude on the crack-surfaces. Numerical results for the
mode-I dynamic stress intensity factor as a function of the wave number are presented and discussed for
various material combinations and distances between the interface and the cracks.

MSC:
74R10 Brittle fracture
74A40 Random materials and composite materials
74S15 Boundary element methods applied to problems in solid mechanics

Keywords:
bi-materials; sub-interface interacting cracks; time-harmonic loading; dynamic stress intensity factors;
boundary element method

Full Text: DOI

References:

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.