SEMI-INFINITE MOVING CRACK BETWEEN TWO BONDED DISSIMILAR ORTHOTROPIC STRIPS

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Abstract - The problem of a semi-infinite moving crack between two bonded dissimilar orthotropic strips has been investigated. The crack surfaces have been assumed tobe traction free with constant normal displacements applied at the boundary surfaces of the strips. The problem has been solved with the help of Wiener-Hopf technique. Initially the problem has been reduced to the standard Wiener-Hopf equation with the help of Fourier transforms. Then the Wiener-Hopf equation has been solved asymptotically to obtain the required quantities of physical interest. This problem is in fact a generalization of previous two papers by the same authors where the problem of a semi-infinite moving crack in an orthotropic strip has been considered and in the later one the problem of a semi-infinite moving crack between two bonded dissimilar isotropic strips has been considered. There are fairly a large number of papers where diffraction of waves due to presence of cracks have been investigated although most of the problems considered are the diffraction due to SH-waves or the diffraction problems in single medium only. In this paper a semi-infinite moving crack has been considered which is propagating along the interface of two bonded dissimilar orthotropic strips of equal width. The crack is due to two constant normal displacements applied at the boundaries. The crack surfaces have been assumed as traction free. A constant homogeneous normal load has been applied to the system so that the boundary conditions become suitable for applying the Wiener-Hopf technique. The Fourier transform technique has been applied to reduce the boundary value problem to the standard Wiener-Hopf equation. The Wiener-Hopf equation has been solved asymptotically to find the limiting expressions of normal stress and displacements in Fourier transform plane. Using asymptotic Fourier inverse transform the expressions for stress intensity factor and crack opening displacement have been obtained and plotted graphically against various parameters to show the effects of those parameters on stress intensity factor and crack opening displacement.

Keywords - Semi infinite Crack; Othotropic Media; Wiener-Hopf Technique; Stress Intensity Factor; Crack Opening Displacement.