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Dispersion and Stability Analysis of Waves in Pre-Stressed Imperfectly Bonded Layered Composites

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The dispersive behaviour and stability issues of time-harmonic waves propagating in an imperfectly bonded pre-stressed symmetric layered composite is considered. The bimaterial composite consists of incompressible isotropic elastic materials. The shear spring type resistance model employed to simulate the imperfect interface can accommodate the extreme cases of perfect bonding and a fully slipping interface. The dispersion relations for both extensional and flexural waves are obtained by formulating the corresponding incremental boundary value problems. The asymptotic behaviour at low and high wavenumber limits are discussed. The stability criteria are studied and neutral curves are plotted. Numerical results are given for Mooney-Rivlin and Varga materials. The effect of the imperfect interface is clearly evident in the numerical results.

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