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Investigation of Stoneley Waves in Multilayered Plates

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Abstract : Stoneley waves are interface waves that propagate at the interface between two solid media. In this study, the dispersion characteristics and wave structures of Stoneley waves in elastic multilayered plates are displayed and investigated. With a perspective of bulk wave, a reasonable assumption of the potential function forms of the expansion wave and shear wave in nth layer medium is adopted, and the characteristic equation of Stoneley waves in a three-layered plate is given in a determinant form. The dispersion curves and wave structures are solved and presented in both numerical and simulation results. It is observed that two Stoneley wave modes exist in a three-layered plate, that conspicuous dispersion occurs on low frequency band, that the velocity of each Stoneley wave mode approaches the corresponding Stoneley wave velocity at interface between two half infinite spaces. The wave structures reveal that the in-plane displacement of Stoneley waves are relatively high at interfaces, which shows great potential for interface defects detection.

Keywords : characteristic equation, interface waves, potential function, Stoneley waves, wave structure
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