

Uniqueness Results for the Reflection-Transmission Problem

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Reflection and transmission of mechanical waves are investigated for a uniaxially inhomogeneous viscoelastic layer which is sandwiched between two homogeneous elastic half-spaces. As a result, uniqueness is established for the reflection-transmission process regarded as a initial boundary value problem. The approach is entirely developed in the time domain subject to the restriction of the normal incidence. Two main ideas prove crucial. First, the boundary conditions for the layer are written in a form which accounts directly for the outgoing character of unknown waves. Second, motivated by thermodynamics, an energy functional is considered for the viscoelastic layer which is a potential for the traction. The total energy of the layer is shown to decay in time because of the boundary conditions. Owing to the boundedness of the speed of propagation and to the initial value problem, the reflected and transmitted waves are taken to have compact support. Uniqueness is then established for C^2 solutions in the space-time domain.

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