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A radiation condition for time-harmonic elastic waves in half-spaces with free boundary*

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Abstract

In this work we deduce an explicit Sommerfeld-type radiation condition able to prove uniqueness for the problem of outgoing wave propagation in isotropic elastic half-spaces with free boundary condition. The expression is obtained by a rigorous asymptotic analysis of the Green's function associated with this problem. Observe that this is an exterior problem with unbounded frontier. The main difficulty is that the free boundary condition allows the propagation of Rayleigh waves guided by the unbounded surface. Hence, we mainly observe three types of waves in the far field expansion (each one with its own velocity) : **the pressure wave, the shearing wave and the Rayleigh or surface wave**. Thus, the outgoing wave behavior needs to be described by a radiation condition different from the usual Kupradze's condition [2], which is used in exterior problems with bounded boundaries (where we only see pressure and shearing waves in the far field).

This is an extension to the elastic case of the previous result in [1].

References

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- [2] KUPRADZE, V.D., *Three-dimensional Problems of the Mathematical Theory of Elasticity and Thermoelasticity*. North-Holland Series in Applied Mathematics and Mechanics, vol. 25, New York, 1979.

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