

Strongly Coupled Inversion of Rayleigh Dispersion and Attenuation Curves

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Some of the most common procedures used by seismologists and geophysicists to solve problems associated with the propagation of surface waves in inelastic media are based on the assumption of weak dissipation. One important consequence of this assumption is that surface waves attenuation coefficients can be easily computed from the solution of the corresponding elastic eigenproblem using variational principles. Although the assumption of weak dissipation is often reasonable for the strain levels mobilized in geomaterials during the propagation of seismic waves, there are situations where this is not true. In such cases the rigorous solution of both Love and Rayleigh forward and inverse problems become more involved because the governing differential equations are complex-valued. This short memoir illustrates an elegant technique for the solution of the Rayleigh inverse problem in arbitrarily dissipative, linear viscoelastic media. The technique is based on using the holomorphic properties of Rayleigh phase velocity, and upon a previous result on the solution of the corresponding forward problem.

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