

# A multigrid based iterative solver for the frequency domain elastic wave equation

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A preconditioned Krylov subspace method is presented for the solution of the elastic isotropic wave equation in the frequency domain. We exploit an idea successfully employed for the acoustic wave equation by a number of authors: the preconditioner is based on the damped elastic differential operator and an approximation to its inverse is obtained by a multigrid cycle.

Local mode analysis highlights that the various multigrid components must be adapted to the elastic case. Different P- and S-wave propagation velocities produce grid anisotropy that should be accounted for by effective smoothing. Clearly, the direction of strong coupling varies with respect to the different components of the wave-field. Numerical results confirm the prediction of the smoothing analysis.