COMPARISON OF THE FORT APPROXIMATION OF THE COUPLING RAY THEORY WITH THE FOURIER PSEUDOSPECTRAL METHOD

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We are testing performance and accuracy of the shear-wave coupling ray theory based on the first-order ray tracing (Farra and Pšenčík, 2008, 2010) by comparing its results with results of the anisotropic Fourier pseudospectral method based on Reshef et al. (1988). The coupling ray theory was designed for studying shear-wave propagation in inhomogeneous, weakly anisotropic media where standard ray theories for isotropic and anisotropic media fail. In our contribution, we study behaviour of the coupling ray theory not only in weakly inhomogeneous media, but also in vicinities of singularities of the standard ray theory.

The Fourier method does not suffer from limitations of the ray methods. It works equally well and with a good accuracy in regular as well as singular regions of the ray method. Although it is based on a computational grid, it allows dealing with relatively strong inhomogeneity. This makes it an ideal tool for testing the coupling ray theory.

We illustrate accuracy of the coupling ray theory on several models of homogeneous and inhomogeneous, weakly or moderately anisotropic media. In addition to comparisons with the Fourier pseudospectral method we also show comparisons with the standard ray theory for anisotropic media, which clearly indicate superiority of the coupling ray theory.

References

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