Wave Inversion Technology, Report No. 1, pages 153-154

– Review –
Modeling: Asymptotic Methods

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N. Ettrich developed a 2D finite-difference eikonal solver for elliptically anisotropic media. It is an extension of a similar method for isotropic media. A perturbation scheme is introduced to consider arbitrary symmetry systems. The method is orders of magnitude faster than two-point ray tracing.

N. Ettrich developed a 2D hybrid method for the computation of multi-valued traveltime maps. The method combines finite difference (FD–) eikonal solvers with wavefront construction (WFC) and, therefore, takes advantage of both the efficiency of FD–methods and the ability of ray methods to compute later, higher energetic arrivals. The applicability of the hybrid method to complex, weakly smoothed models is demonstrated.

J. Falk and E. Tessmer show the application of adapted grid spacing methods within finite-difference wave modeling algorithms to the computation of synthetic VSP and single well monitoring seismograms. Adapted grid spacing is required to consider different scales of the order of several magnitudes between seismic wavelength and the borehole size. Furthermore they show the results of investigations on the accurate staggered grid representation of fluid-solid interfaces.

O. Koslowski and N. Ettrich investigate methods for computing traveltimes in dependence on frequency. A method of velocity smoothing perpendicular to the actual wavefront turns out to be appropiate to describe effects of dispersion in complex models correctly.

A. Leidenfrost and D. Gajewski investigate the applicability of a FD eikonal solver to 3D problems. The properties they focus on are accuracy, memory consumption and computational time. Application to a gradient and a two-layers model shows high speed and good accuracy when compared to the graph method.

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