NEW NUMERICAL METHODS FOR WAVE EQUATIONS IN GEOSCIENCE APPLICATIONS

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We present new algorithms of solving time-dependent seismic problems. These approaches make it possible to simulate the wavefield propagation in heterogeneous media simultaneously for many sources (like earthquakes ore industrial explosions). The first algorithm is based on a combination of the finite integral Fourier transforms and the matrix decomposition method. The second approach is developed at the last time and based on the integral Laguerre transforms along the time coordinate. This algorithm is very effective and can be applied to the elastic wave equations of the first order system for the velocity and stresses as well as to the acoustic wave equation of the second order with a variable velocity. The technique can be also applied to a number of methods including the finite difference method, the finite element method or spectral method. At present, this approach has been developed for the modeling of the attenuation effects in the elastic medium. The results of calculations of syntetic seismograms for different models are given.