
FINITE-DIFFERENCE MODELING OF 2-D COMPRESSIONAL WAVEFIELD

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This project discusses the derivation of the 2-D compressional wavefield (P-wave) and its finite-difference approximation. In developing this wavefield, we have two approximations. First, the subsurface density is assumed to be a constant. Second, the angle of wave propagation is less than 150° with respect to the surface (horizontal direction). The algorithms are used to demonstrate the propagation of P-wave through a simple subsurface model. Although not discussed in this project, the same algorithms are also able to model the propagation of P-wave in another complex model and the success of depth-imaging algorithms in recovering the subsurface structures indicates the accuracy of the approximations for most modeling purposes. Future studies include modeling P-wave in 3-D, modeling elastic wavefield in 2/3-D, and extending the angle of propagation to more accurately model incoming waves at the edge of the computational grid.