FAST KIRCHHOFF DEPTH MIGRATION

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Kirchhoff depth mIgration of seismic data is dependent on accurate velocity models and methods of computing travel times. Here I discuss travel time computation methods which are very compute intensive; including ray tracing, Eikonal level set solvers, and wave front schemes. Travel time fields for source-receiver locations are used in the Kirchhoff algorithms to place the recorded seismic trace into a summation cube. The constructive sum results in a coherent image. Each of the methods for computing rays, level sets, and wave fronts can be adapted to operate in fast dedicated compute algorithms. These algorithms will be examined for efficiency, accuracy, quality of results. The resulting Kirchhoff migration algorithms will be applied to model data sets to validate the migration quality and computational effort. These unique algorithms will be compared to the Seismic Unix processing methods for both quality and runtime using 2D data. These imaging methods discussed are all applicable to large 3D seismic marine and land data processing projects, near surface land projects, and data collected using borehole seismic source-receiver configurations. Seismic depth imaging is a powerful data processing resource which will be illustrated using 2D/3D data examples.