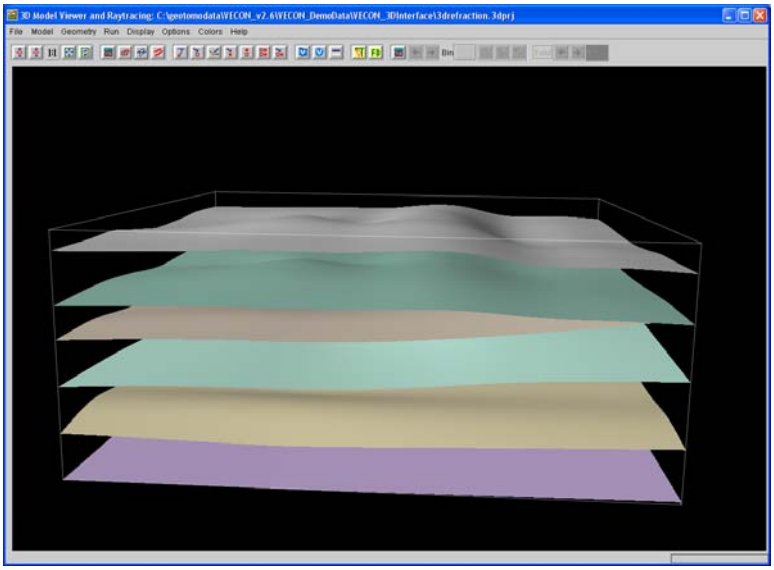
Project 7

3D Refraction Wavefront Tracing for Layer-Grid Combined Models

Develop an unconditional stable 3D wavefront tracer for calculating refractions from a number of layers. The basic idea is to apply graph theory (Moser, 1991). However, our problem is unique, the model is layer-based, but within each layer velocity varies laterally in 3D. Unlike graph wavefront tracer in grid model, our tracer is able to identify refractions from specific layer in the subsurface. Therefore, we may use the wavefront tracing results to match with refraction data from different layers directly and develop tomography in future.

Development: during this class, develop a 3D wavefront tracer for the following 3D mesh system. If there is enough time, we will continue with tomography effort. This project is similar to the forward modeling approach applied in Qin Cao's 2D tomography project, but for 3D.



Model:	slowness(nx,ny,nlayer), xmod(nx,ny,nlayer), ymod(nx,ny, nlayer), thickness(nx,ny,nlayer), topo(nx,ny,nlayer)
Raypath storage:	ipath(nx*ny*nlayer), backward tracking For a point ij0, ij1=ipath(ij0), previous point on the same ray. If ipath(ij)=0, pointing to source from ij.
Sources:	sx(ns), sy(ns),sz(ns)
Receivers:	rx(mr,ns), ry(mr,ns), rz(mr,ns), nr(ns)

Source Codes Offered:
fwd.f /tomo3d_inv.f

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