1027-86-128 **Eric A Dussaud*** (eric.dussaud@total.com), 800 Gessner, suite 700, Houston, TX 77024, and **William W. Symes** (symes@rice.edu), 6100 Main St. - MS 134, Houston, TX 77005. *Reverse Time Migration Using The Adjoint-State Method.*

Seismic imaging techniques rely on artificial sound sources to probe the Earth's subsurface. Seismic waves generated by these sources are reflected at places in the subsurface where the rock mechanical properties vary discontinuously. The reflections are subsequently recorded at the surface by receivers. Reverse-time migration is the process of propagating backwards in time (last time sample first) the recorded reflected wavefield and crosscorrelating it with the wavefield from the source to create an image. The algorithm can also be formalized as a way of computing the gradient of the least-squares cost functional arising in the data-fitting approach to the inverse problem of reflection seismology, in which a model of the earth is determined so as to minimize the mean square error between the observed data and the data simulated using that model of the Earth. This talk will show that the implementation of such a calculation using finite differences may be performed with the adjoint state method, describe a realization of the algorithm which minimizes the computational complexity associated with the method, and present 3D images obtained with this particular approach to reverse time migration. (Received February 23, 2007)