

**Volume Based Curvature Computations
Illuminate Fracture Orientations,
Lower-Mid Paleozoic, Central Basin Platform, West Texas**

*Charles H. Blumentritt, Kurt J. Marfurt, and E. Charlotte Sullivan
Allied Geophysical Laboratories, University of Houston*

ABSTRACT

Volumetric curvature analysis is a simple but computationally intensive procedure that provides insight into fracture orientation and regional stresses. Until recently, curvature has been limited to computation along horizon surfaces that may be affected by unintentional bias and picking errors introduced during the interpretation process.

Volumetric curvature is best estimated in a two-step process. In the first step, we use a moving analysis cube to estimate volumetric reflection dip and azimuth that represents the best single dip for each sample in the full volume. In the second step, we calculate curvature from adjacent measures of dip and azimuth. We use larger curvature analysis windows to estimate longer wavelength curvatures. This technique allows us to output full 3-D volumes of curvature values at one or more scales of analysis.

We apply these techniques to a data set from the Central Basin Platform of West Texas and find lineaments not observable with other seismic attributes. These lineaments indicate that, in the Lower Paleozoic interval, a left-lateral shear couple with an azimuth of 90° controls the local stress regime. Such a model predicts that extension faulting and fractures will be oriented N 40-45° E. The example demonstrates the potential of this new technology to determine stress regimes and predict azimuths of open fracture systems at any time or stratigraphic position within a 3-D cube. This provides a new and rapid method of seismically analyzing fractured reservoirs.