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Detection and Extraction of Fault Surfaces in 3-D Seismic Data

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ABSTRACT

In this paper, an efficient method is proposed for detecting and extracting fault surfaces in 3-D seismic volumes. The seismic data is transformed into a volume of Local Fault Extraction (LFE) estimates, representing the likelihood that a given point lies on a fault surface. The fault surfaces are partitioned into relatively small linear portions, which are identified by analyzing tilted and rotated subvolumes throughout the region of interest. Directional filtering and thresholding further enhance the seismic discontinuities attributable to fault surfaces. The LFE method demonstrates a more reliable and convenient interpretation tool for fault surfaces, compared to the state-of-the-art coherence analysis. In particular subtle faults having minimal offsets can be detected in noisy complex geological structures.