
Random Noise Removal of Seismic Attribute Data via Complex-valued Wavelets

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Volumetric curvature and coherent energy gradient attributes can improve the detection of linear geologic features but may introduce high frequency noise. Existing edge-preserving smoothing algorithms can be used to minimize the high-frequency noise but they typically do not preserve small vertical lineaments well. This paper introduces a new 3D seismic noise reduction technique that preserves very small features and lateral discontinuities (edges) without introducing high frequency noise or phase distortion. Phase distortion is minimized through the use of a non-orthogonal, complex valued, log-Gabor wavelets in the frequency domain. The theory and examples of its application to both synthetic and real 3-D data from Saudi Arabia are described in this paper. These examples clearly show a reduction in random noise along with the preservation of vertical lineaments and high-frequency signal.
