

## **Enhancing the Vertical Resolution of Seismic Data by Using Spectral Inversion Technique**

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### **Abstract**

Expanding the frequency bandwidth of surface seismic data is a never-ending quest for geophysicists because increased seismic resolution is essential for extracting stratigraphic detail from seismic images. While both vertical resolution and horizontal resolution is important for interpreting small geological features on seismic data. This article is based on a relatively new technique for improving vertical resolution.

This paper focuses on the application of spectral inversion technique that attempts to separate signal from noise while enhancing only the high frequencies from the existing seismic data using high-resolution spectral decomposition. Spectral inversion can be described as a sparse-spike inversion driven by geological assumptions. It keys on local frequency spectrum obtained by spectral decomposition. Theoretically, a high signal-to-noise ratio and the exact knowledge of the seismic wavelet at reservoir levels yield seismic resolution far below tuning thickness.

The technique has been used with varying degree of success within OMV group (Kazakhstan, Austria, Tunisia, UK and Pakistan). The quality of spectral inversion results is dependent on the signal/noise ratio of the input data. In the mentioned cases, there are few where results were not encouraging due to poor signal/noise ratio. However, in most of the cases the technique generated highly encouraging results on datasets from different parts of the world and led to identification of undrilled compartments/ prospective areas.