

# Inversion of seismic data

The processing of seismic data has progressed significantly in the last few years from estimating the structure of the subsurface to seismic inversion for better characterizing the rock properties. Two seismic inversion processes that are of interest are Least Squares Migration (LSM) and Full Waveform Inversion (FWI). LSM defines a diffraction matrix, and then uses the prestack seismic data to invert for a reflectivity model. The estimated reflectivity model contains higher frequencies than a conventional migration but is a computationally expensive process and requires very large computer memory. FWI is a promising process that builds a velocity and density subsurface model, then computes synthetic data from the model and compares it to the real data. The difference between the synthetic and real data is used to update the velocity and density models. This method requires a smooth starting velocity and is somewhat sensitive to noise. The basic physics, and some of the advantages and disadvantages of both methods will be presented along with examples of their application.