Modified Extended Elastic Impedance and Simultaneous Avo Inversion for Estimating Reservoar Lateral Lithologic and Pore-Fluid Heterogeneities from Seismic Data

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Abstrak

Lateral lithology and saturation heterogeneities are key aspects of reservoir characterization. Amplitude versus offset (AVO), which is based on the change in reflection response caused by the change in incident angle, provides the relationship between reservoir parameters, petrophysical parameters, and elastic constants.

Conventional AVO analysis and modeling by iteratively picking on the reflection event can sometimes be challenging due to practicalities of picking, resolution problems, and thin layer effects. Lithofacies identification based on seismic impedance inversion can alleviate these difficulties. Impedance inversion is also relatively free from the horizon interpretation problem, which can be subjective in heterogeneous reservoirs.

In this study, we modify the Extended Elastic Impedance (EEI) method to predict lateral lithologic and saturation heterogeneities from seismic data. To validate the developed method, we apply Simultaneous AVO inversion. The modified extended elastic impedance method uses a least squares weight combination of intercept and gradient to produce lateral and vertical elastic parameters or log analysis of interest. This method provides more reliable and stable results compared to the original extended elastic impedance. In addition, the method produces any type of elastic parameter without an explicit relation function.