The Polynomial Method: An Accurate Tool to Estimate Reservoir Depths

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Abstract

Estimating depths of geologic tops accurately is a major concern when setting wells drilling plans. Seismic data has been widely utilized in conjunction with well control to predict such depths. Depth predictions have been attained through various means, such as average and interval velocities as well as pre-stack depth migration. This work applies the polynomial method to accurately predict the reservoir depths over a Saudi oil field using seismic times and depths from existing wells.

This method finds the polynomial that best fits seismic times to reservoir depths at existing wells and later applies such a polynomial to estimate tops at future wells. This method proves to be effective as it provides a measure of the prediction uncertainty as well through running blind tests over nearby wells. Velocity, which may be thought to be overlooked, is implicit in the polynomial coefficients. This method requires dividing the field based on structure and well distribution into different compartments in which each has its own polynomial. Besides its accuracy and the error estimate it provides, the method is remarkably fast as it does not require interpreting the whole seismic volume or gridding any data. However, it needs to be utilized with caution in the presence of anomalous velocities.