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Please fill in your abstract title.	Predicting Porosity via Optimized Rock Physics Models

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Abstract

Porosity, fluid saturation and lithology are key factors in reservoir evaluation. Predicting such physical properties before drilling is one of the most challenging tasks in the oil and gas industry. The ability to accurately estimate these properties pre-drill has a significant impact on drilling decisions and reduces the risk of drilling dry holes. The elastic parameters of any medium, such as ρ, bulk and shear moduli are affected by the properties of that medium such as porosity. Therefore, one can use such parameters to estimate the properties of the medium.

In this study, many rock physics models combined with a systematic grid search method are used to predict reservoir properties. First, the rock physics models are built with different porosities and pore geometries by the means of a differential effective medium. This allows to account not only for porosity but also for pore geometry by the use of pore aspect ratio. The porosity varies within a range of values depending on the lithofacies, while the aspect ratio ranges between 0.03 and 0.5. Second, the models are saturated with a single fluid (natural gas, water or oil) filling the pore space. Third, the elastic parameters associated with each model are estimated and later optimized against an observed dataset derived from sonic wireline logs.

The methodology has been applied to two synthetic datasets to predict reservoir properties, such as porosity. The agreement between the predicted results and the synthetic ones is excellent. The next stage is to extract the elastic parameters from surface seismic data to predict the reservoir properties before drilling, which is the primary goal of the study.