Topic: Predictive reservoir model for delta front setting through rock physics driven geostatistical inversion

By: Jimmy Ting, CGG

A reservoir model that is able to accurately predict the historical production is always the dream of a reservoir engineer. A good and detailed understanding of the subsurface reservoirs is a pre-requisite. So, how could we provide such a reservoir model to the reservoir engineer?

The conventional well-constrained reservoir modeling method using well logs, geologic information, and depth structure interpreted from seismic data often fails to replicate the past production (history matching) even after rigorous application of porosity and permeability modifiers. The main reason is the lack of information between the available well locations, beside the fact that the drilled wells are themselves preferentially located geologically introducing high amount of uncertainty into the reservoir model.

An integrated seismic-to-simulation workflow is presented in this talk. In this workflow, the use of 3D seismic data with dense spatial resolution provides a great deal of lateral facies and rock property information that is essential to the static model. A rock physics driven multiple stack geostatistical inversion is the cornerstone of this workflow. The Markov Chain Monte Carlo geostatistical inversion method integrates the geologic knowledge, geostatistical model, well data with high vertical resolution, and seismic data with high spatial resolution in an unbiased manner to produce multiple plausible realizations of facies and reservoir properties with high precision, thus reducing the uncertainty of the resultant reservoir model. The geostatistical inversion workflow incorporates strict blind well tests and dynamic simulation to optimize the input data and inversion parameters; a static model that integrates logging, seismic, geology and dynamic data was developed.

The resultant reservoir model matches the existing production, distribution and heterogeneity of the reservoir, residual oil, location of “sweet spots” and leads to improved production rates and higher estimated ultimate recovery. It is ideal for placing new drilling locations, predicting future production and evaluating alternative reservoir management scenarios.

Speaker: Jimmy Ting

Jimmy Ting is the Region Manager for CGG GeoSoftware Far East based in Kuala Lumpur. He obtained a B.Sc in Applied Geology in 1991 with special interest in study of carbonate rocks. He has 26 years of experience in the oil and gas industry. His main expertise includes seismic processing and quantitative seismic reservoir characterization (AVO analysis, forward modeling, velocity modeling, geopressure prediction, rock physics and seismic inversion). Key designations held over the years include QI Geophysicist in Sarawak Shell, Principal Project Geoscientist in Jason, Global Training and Technical Support Manager in Jason, and Product Strategy Manager in CGG GeoSoftware Houston.