

An Integrated Schematic Approach to Hydraulic Flow Unit Determination and Validation

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Reservoir characterization at the deep offshore subsurface level calls for cost effective and highly precise evaluation techniques with the uncertainty that largely connotes characterization between wells to set the stage for full exploitation of an oilfield.

Reservoir partitioning methods based on various rock characterization schemes with either statistical tools or sound theoretical footing have improved rock properties estimation along un-cored well path and between well spacing. Bayesian statistical inference with emphasis on independent and dependent well-log responses taking note of well-log discretization and non-discretization is further examined alongside the Elman ANN and the recent classification tree concept are applied to flow unit delineation and prediction in both cored and un-cored wells having well-log responses. Non-discretized well-logs responses will further reduce the errors associated with selecting bin sizes as relates to multi-normal distribution by using the Bayesian inference method with the possibility of incorporating a stochastic approach compared to the non-parametric ANN.

Though, offshore fields have less number of wells compared to 150 wells of an onshore field under study, but, the same technique and experience gained transcends this case. Since flow unit is usually characterized by CT scan showing pore throat distribution for groundtruthing, the lack of such data calls for interwell flow unit distribution and within well path as it directly corresponds to individual well performance.

ANN training of flow unit characteristics and distribution with initial well performance yielded positive correlation. This serves as a tool for validation of flow unit prediction along well path and inter-well prior to full scale simulation study.