



Oil Formation Volume Factor Determination Through a Fused Intelligence

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A b s t r a c t

Volume change of oil between reservoir condition and standard surface condition is called oil formation volume factor (FVF), which is very time, cost and labor intensive to determine. This study proposes an accurate, rapid and cost-effective approach for determining FVF from reservoir temperature, dissolved gas oil ratio, and specific gravity of both oil and dissolved gas. Firstly, structural risk minimization (SRM) principle of support vector regression (SVR) was employed to construct a robust model for estimating FVF from the aforementioned inputs. Subsequently, an alternating conditional expectation (ACE) was used for approximating optimal transformations of input/output data to a higher correlated data and consequently developing a sophisticated model between transformed data. Eventually, a committee machine with SVR and ACE was constructed through the use of hybrid genetic algorithm-pattern search (GA-PS). Committee machine integrates ACE and SVR models in an optimal linear combination such that makes benefit of both methods. A group of 342 data points was used for model development and a group of 219 data points was used for blind testing the constructed model. Results indicated that the committee machine performed better than individual models.

Key words: PVT, oil formation volume factor (FVF), alternating conditional expectation (ACE), support vector regression (SVR).