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Improved Method for the Estimation of Minimum Miscibility Pressure for Pure and Impure CO_2–Crude Oil Systems Using Gaussian Process Machine Learning Approach

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Abstract

The minimum miscibility pressure (MMP) is one of the critical parameters needed in the successful design of a miscible gas injection for enhanced oil recovery purposes. In this study, we explore the capability of using the Gaussian process machine learning (GPML) approach, for accurate prediction of this vital property in both pure and impure CO_2-injection streams. We first performed a sensitivity analysis of different kernels and then a comparative analysis with other techniques. The new GPML model, when compared with previously published predictive models, including both correlations and other machine learning (ML)/intelligent models, showed superior performance with the highest correlation coefficient and the lowest error metrics.

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