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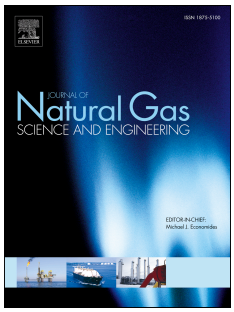

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Investigating the Relative Impact of Key Reservoir Parameters on Performance of Coalbed Methane Reservoirs by an Efficient Statistical Approach

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Abstract

The complex and unique production mechanism of CBM has been examined extensively; however, production from such reservoirs requires more investigation to be well-understood, predicted and enhanced. This study is aimed at probing the significance of some controlling parameters on CBM performance by a statistical approach.

The relative impact of five CBM reservoir parameters (reservoir pressure, cleat permeability and porosity, Young's modulus and Langmuir pressure) on the performance of natural depletion as well as Enhanced Coalbed Methane (ECBM) were numerically investigated. Recovery factor (RF) for primary depletion and ECBM, original gas in place (OGIP) and CO_2 storage were the investigated responses. In order to conduct the research, a synthetic CBM reservoir model was constructed using a commercial reservoir simulator. Since the effects of reservoir parameters on CBM production are quite complicated, it was intended to explore the potential interaction effects between the parameters along with the relative impact of each parameter. Therefore, a professional statistical software, Design Expert, was selected to determine the parameters' effects.

The results show that while recovery factor value in primary recovery has positive correlations with all of the five parameters, cleat permeability and Langmuir pressure play the most significant roles. For ECBM by CO_2 injection, cleat permeability has the most significant effect on recovery factor measure, followed by cleat porosity. The predicted model for ECBM recovery factor suggests that Young's modulus, opposite to the primary recovery condition, has an adverse relationship with RF and the cleat porosity-permeability interaction has a