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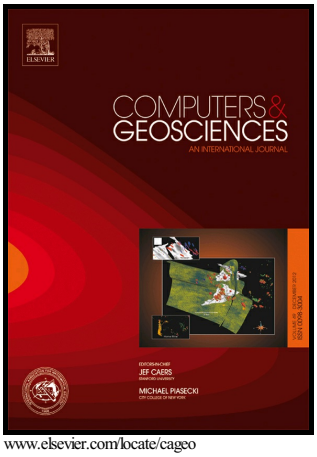

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Development of a data-driven forecasting tool for hydraulically fractured, horizontal wells in tight-gas sands

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Abstract

Tight-gas sand reservoirs are considered to be one of the major unconventional resources. Due to the strong heterogeneity and very low permeability of the formation, and the complexity of well trajectories with multiple hydraulic fractures; there are challenges associated with performance forecasting and optimum exploitation of these resources using conventional modeling approaches. In this study, it is aimed to develop a data-driven forecasting tool for tight-gas sands, which are based on artificial neural networks that can complement the physics-driven modeling approach, namely numerical simulation models. The tool is designed to predict the horizontal-well performance as a proxy to the numerical model, once the initial conditions, operational parameters, reservoir/hydraulic-fracture characteristics are provided. The data-driven model, that the forecasting tool is based on, is validated with blind cases by estimating the cumulative gas production after 10 years with an average error of 3.2%. A graphical-user-interface application is developed that allows the practicing engineer to use the developed tool in a practical manner by visualizing estimated performance for a given reservoir within a fraction of a second. Practicality of the tool is demonstrated with a case study for the Williams Fork Formation by assessing the performance of various well designs and by incorporating known uncertainties through Monte Carlo simulation. P10, P50 and P90 estimates of the horizontal-well

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