

How Match Tolerance Affects Prediction Accuracy in Reservoir Models

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ABSTRACT

A focus of reservoir engineering is predicting the future production of hydrocarbon reservoirs. Based on past production data, reservoir engineers try to estimate the future production. This is usually done by creating a simulated reservoir model that closely represents the physical properties of a reservoir. If the model can accurately reproduce the past production behavior, the future production is presumably accurate from that same model. However, there is still always a level of uncertainty in the predictions because the physical characteristics of a reservoir model can never be reproduced perfectly.

This undergraduate research project argues that an accurate range of future production can be determined with a strictly mathematical approach in analyzing the production data without constructing a physical reservoir model. In this research, production data is analyzed for several wells in three different fields. For any given well, only the decline portion of the production data is taken into account. A computer program, written in MATLAB, reads the data and creates a decline curve function. Then the program calculates the amount of variability between the decline curve and the real data. This is converted into a "variability score" that can be used to estimate the range of uncertainty for future production. For the purpose of the research, only the first half of the decline data is used to create the function. The second half can be used to see if the past production variability is a valid indicator of the future production variability. In comparing the real data to the simulated curve, there is a general correlation in the variability of the data of both the first and second half. This suggests that a decline curve compared to the actual data represents the variability for the future production.

BIOGRAPHY

I transferred to Montana Tech in the Fall semester of 2006 from Purdue University. I am a junior in Petroleum Engineering. My home is in Texas, although I have moved around a lot.