Predicting Reservoir Performance Using Stochastic Monte Carlo Simulation

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Abstract

ABSTRACT

Predicting reservoir performance using conventional deterministic models can be tasking, especially for very complicated reservoir systems. Our paper presents the use of Monte Carlo model for simulations; logic and analysis to achieve useful probabilistic stochastic simulations results in a very efficient and visual manner with Microsoft excel spreadsheet. A Monte Carlo simulation run was carried out for a typical representative reservoir data. The simple Darcy equation was used as the deterministic model while the normal distribution model was employed as the probabilistic density function model. These models were used to construct a stochastic simulation algorithm to predict performance of reservoir systems. Our work analysed 5000 runs using random inputs. By using random inputs, we are essentially turning the deterministic model into a stochastic model which is then solved iteratively over the chosen number of runs. The darcy equation was used as the deterministic model and it was evaluated using a single well data from the reservior data table. A comparison of the deterministic result [5,219.83], for the single run gave a stochastic value of [3,565.34] for the Monte Carlo Simulation [5430.49], and second run gave a more accurate stochastic value [5,234.07], shows that multiple run can achive closeness to actual result through the Monte Carlo Method. The result being quite close to the deterministic value on second run demonstrated that the Monte Carlo iteration can achive a high enough to reliable estimates multiple runs. Various statistical simulators were also employed to display the standard deviation of the range of generated data from the mean and the standard error was also calculated.

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