Paper A:
Reservoir Characterization during Underbalanced Drilling: Methodology, Accuracy, and Necessary Data

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Abstract

In this paper a novel methodology for reservoir characterization during underbalanced drilling is presented. In this methodology we are using a transient wellflow model coupled to a transient reservoir model, and use estimation techniques to estimate reservoir properties. Our focus is to estimate the permeability and reservoir pressure along the well, using measured data usually available while drilling. The measured data are outlet rates, pump pressure and downhole pressure. The liquid injection and gas injection rates are used as input to the model.

Our finding is that estimating permeability and reservoir pressure simultaneously is a difficult estimation problem, and may lead to large uncertainties in the estimates. If we assume that the reservoir pressure is known, however, reliable estimates of the permeability is obtained. A methodology for uncertainty analysis is also presented and can be used to evaluate necessary measurements for proper reservoir characterization.