Production Analysis of Gas Shale Wells : Different Solutions for Different Data Scenarios

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Introduction

Production analysis is required to evaluate well productivity, forecast production ahead and calculate economics for budgetary reasons.

Depending on the amount of data on hands, production analysis may be performed using classic statistical techniques, such as decline curve analysis where production trends are found from historical data and extrapolated over an extended period of time, typically with terminal declines. This form of forecasts is frequent when wells are not well characterized. Extensions of these forms of decline can be the linear flow forms, as it is well established in the literature that cumulative production is a linear function of square root of time. However this is only valid over a certain period of time, until boundary dominated flow prevails.

Having more information of the actual reservoir allows to create numerical models which capture gas flow behaviors in nano Darcy rock. Time dependant desorption for instance, transient flow in the matrix cells, or permeability dependency to pressure may be modeled. It is then possible to history match clean up periods and initial gas flow, to better forecast long term performance. In cases where the hydraulic fracture network is characterized with microseismic, better solutions with numerical models are also pertinent.

We will demonstrate in this discussion this various techniques through case examples.