

The Importance of Hydrodynamics in the Geomechanical Understanding of Oil and Gas Plays: Upper Mannville Case Study

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Summary

The importance of geomechanics to all manner of conventional, unconventional and specialized plays such as SAGD projects is growing more evident with time. Geomechanics is a fundamental component of reservoir knowledge whether it be in regard to wellbore stability, hydraulic fracture modelling, understanding the development and current role of natural fracture networks or maintaining the containment of steam chambers.

A complete geomechanical model includes quantified orientations and magnitudes of the three principal in situ stresses, mechanical rock properties and formation pressures. The availability, abundance, distribution and quality of data for constraining these parameters are highly variable and depend strongly on location and data type. In the Western Canada Sedimentary Basin, pressure data is abundant geographically and stratigraphically. Unfortunately, quantity does not equate to quality. Fortunately, workflows can be developed to address this fact, workflows that need to adapt as data collection and interpretation methods evolve.

This talk will provide a case study to illustrate how variations in pore pressure affect drilling and completions in the Upper Mannville Play in west-central Alberta. It is well known that pressure compartmentalization and considerable pressure differences in the Upper Mannville and the over-lying section cause unique challenges in this play. This presentation will illustrate how understanding the play from a hydrodynamics perspective can greatly add to the geomechanical picture, which can then directly address these challenges.

Theory / Method / Workflow

Key inputs to a geomechanical model will be briefly outlined, emphasizing the role of pore pressure. Available pressure data types will be described, and methods for quality control discussed. Real pressure data will then be reviewed and a pressure profile for the study area developed. The profile will serve as input into a geomechanical model to link pressures directly to well experience.

Results, Observations, Conclusions

Attendees should come away from the talk with a good understanding of one very important, practical application of hydrodynamics work.

Novel/Additive Information

This case study is intended to follow the Hydrodynamics 101 talks in the Fundamentals 101 session. Interested attendees are strongly encouraged to attend these talks.

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