

Geomechanics of Shale Gas Reservoirs

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Summary

This talk looks at various log based approaches for estimating key geomechanical properties of shale gas reservoirs. Variations in lithology, sedimentology, regional stresses due to tectonics and changes in overburden can affect completion quality and hence productivity. Horizontal stress anisotropy and its azimuth, transversely isotropic and vertically symmetric anisotropy, desorption and diffusion potential of the reservoir are important concepts, along with estimates of volumetrics.

Introduction

Young's modulus, poisson's ratio, bulk modulus and shear modulus have long been used to delineate mechanical properties of conventional reservoirs. With the modern understanding of shales as highly heterogeneous reservoirs, the scope of mechanical properties has widened to include the determination of the direction in which these properties are being estimated. New measurements have made this possible.

Common questions now include;

Does my reservoir have the same poisson's ratio vertically and horizontally? How does a difference in vertical and horizontal properties affect the propagation of induced fractures? Are there variations in mechanical properties along the length of the lateral that I am drilling? How will changing the azimuth of my horizontal well change the completion quality?

Theory and/or Method

Our approach in this talk will be to discuss the questions mentioned above. We intend to elaborate many new and existing concepts.