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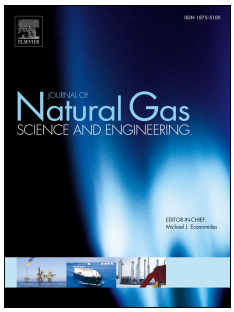

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Overpressure Prediction Using the Hydro-Rotary Specific Energy Concept

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Abstract

Pore pressure predictions from the drilling parameters have experienced little improvement since the inception of the d-exponent concept. Applications of the d-exponent method to pore pressure predictions have produced mixed results, especially in deviated wells and under drilling conditions where bit hydraulic energy has significant influence on the rate of penetration (ROP). In this paper, a new energy-based pore pressure prediction technique using the concept of hydro-rotary specific energy (HRSE) is presented. The HRSE approximates the total energy required to break and remove a unit volume of rock. Overpressure prediction using the HRSE method is based on the principle that overpressure intervals with lower effective stress will require less energy to drill than the normally pressured intervals at the same depth. The new technique is tested using a recently drilled deep vertical exploratory gas well in the Tertiary Deltaic System in the central swamp region of the Niger Delta in Nigeria. The pore pressure estimates from the HRSE concept are compared to: (1) the pore pressure estimates derived from the d-exponent and shale compressional velocity, (2) the actual pore pressure measurements taken in the reservoir