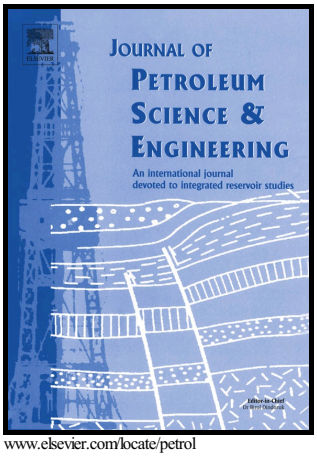

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Integrated Fracability Assessment Methodology for Unconventional Naturally Fractured Reservoirs: Bridging the Gap between Geophysics and Production

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Abstract

Fracability evaluation in unconventional reservoirs is one of the most important initiatives for economic success. Most evaluation methods in geophysics and well logging are based on calculating rock mechanical properties, in which a frequently used term is brittleness. However, oil & gas production, mainly determined by effective natural fracture networks in unconventional low-permeability reservoirs, is the final goal of reservoir stimulation. In this work, a novel integrated methodology was proposed to correlate conventional post-stack seismic data to well production rate. It aims to pre-evaluate regional stimulation performance, facilitating investment decision-making in line with global oil prices and environmental consideration. Structural occurrence, seismic maximum curvature, and geomechanics parameters were combined in a physical model to evaluate underlying development and activation of natural fractures, result in the activation index F_1. The potential of artificial induced fractures were quantified as normalized index F_2 by integrating mechanical item based on fracture mechanics and fluid flow. Accordingly, a fracability sweetness index (F_{sweet}) model was built to correlate standardized well production rate (Q_{eff}). A Case study of a naturally fractured igneous reservoir with 8 wells showed agreement between F_{sweet} and Q_{eff}. A considerable part of highly active fractures with

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