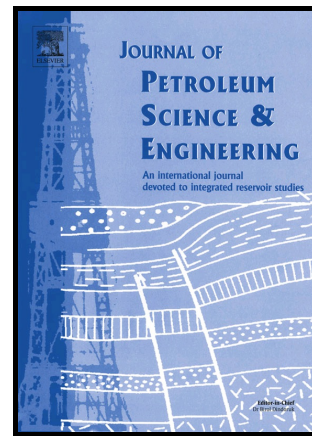


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Diagnostic of Changes in Reservoir Properties from Long-term Transient Pressure Data with Wavelet Transform

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Abstract

For conventional well testing which is carried out over several days or several weeks, reservoir properties are usually assumed to be constant, but this assumption is often not valid for long-term transient pressure data acquired from a permanent down-hole gauge, which can record down-hole transient pressure data for several years. For example, skin factor may increase due to formation damage, or decrease due to stimulation operations during the time of long-term production. Monitoring changes in reservoir properties is important for reservoir monitoring. This paper proposes a novel method of diagnosing the change in reservoir properties with the wavelet transform. A new diagnostic function has been defined that can detect and qualify changes in reservoir properties. Theoretical analysis and a field example demonstrate this new method and its potential for application in oilfield.

Keywords: well testing; pressure-transient analysis; wavelet transform; reservoir properties change; permanent down-hole gauge

Nomenclature

A =Amplitude of WT coefficient

A_{urc} =Unit Reservoir System Response (URSR)

B_o = Oil formation volume factor, rb/STB

b = The proportional coefficient of WT amplitude and change in rate

C_o = Oil compressibility, 1/psi

C_f = Rock compressibility, 1/psi

C_s =Wellbore storage coefficient, bbl/psi

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