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E-BABE Permeability analysis of influencing factors of tight reservoir cores with high pressure

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Permeability is a key parameter for characterizing reservoirs, forecasting permeability, and making development plans. Steady-state permeability measurement methods and gas slippage theory are well known to determine tight core permeability. Previous studies showed the remarkable influence of temperature and effective stress on permeability, and recent reports discovered deviations in slippage theory with low back pressure (0.1–7.6 and 0.1–8 MPa). The latest high-pressure micro-flow meter is adopted to investigate permeability changes and influence of gas rate, effective stress and temperature under high-range back pressure (0.1–38 MPa). The measured tight permeability complies with classic Klinkenberg slippage theory in low back pressure but deviates in high back pressure. The deviation is observed to rise as back pressure increases and reaches a constant value at higher pressure with the same differential pressure. For different differential pressure, the gas slippage effect is observed to decrease and disappear as back pressure increases. The apparent permeability rises with increasing flow rate and this trend is more evident when the back pressure is higher. In low back pressure, effective stress and temperature exert anotable influence on permeability; the apparent permeability decreases with increasing effective stress and temperature. However, as back pressure increases, effective stress and temperature have less influence on permeability.

Biography

Wei Qing An is a Doctoral candidate in China University of Petroleum, Beijing. He participated in mentor of National Natural Science Foundation of China (51334007) project during the period of study for a Doctorate. He studied seepage rule in tight reservoir cores. He has published 3 papers in reputed journals and applied for 6 invention patents.

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