



WAVE MOBILIZATION OF OIL DROPS JAMMED IN PORE CHANNELS

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KEYWORDS:

Main subjects: flow visualization

Fluid: residual oil, water

Visualization method(s): digital microphotography

Other keywords: reservoir rock, porous sample, oil drop, acoustic wave

ABSTRACT: Mobilization of hydrocarbon drops jammed in pore restrictions has been studied. The experimental equipment includes porous sample placed in the copper thermostat with piezoceramic vibrator (Fig.). The two-dimensional glass porous model is made with the help of photolithographic technique and represents the pore structure of real reservoir rock. Voltage of the adjusted frequency (1-20000 Hz) and amplitude (1-100 V) is supplied to the vibrator. That allows the vibrator to oscillate with amplitude to 10 microns. The microscope and a digital video camera have been used for observation. The highly sensitive electronic scales have been used for measurement of the flow rate of a filterable liquid. The porous sample is saturated with oil or kerosene. Then degassed water filtered during 1-5 hours at the fixed inlet pressure of 0.2 MPa to stop the appearance of oil at the output of the model. Drops of oil trapped in pore restrictions remain in the model. Wave impact is used to mobilize the oil droplets. It has been found that oil drops pass through pore restrictions due to vibroacoustic action by pressure gradient smaller than it is required for their mobilization without action. Furthermore wave impact may lead to coalescence of oil drops.

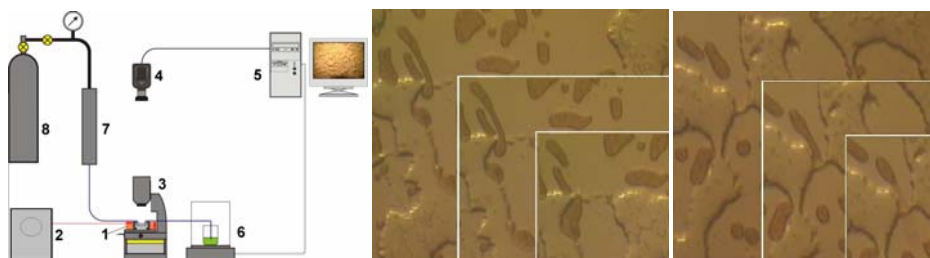


Fig. Experimental set-up for flow visualization (left); mobilization of oil drop at the inlet pressure of 0.114 MPa and frequency of 1.2 kHz (centre), and at the pressure of 0.115 MPa and frequency of 2.0 kHz (right)