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Electrokinetic Regulation of Flow in Microcrack Reservoirs

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Abstract : One of the important aspects of rheophysical problems in oil and gas extraction is the regulation of thermohydrodynamic properties of liquid systems using physical and physicochemical methods. It is known that the constituent parts of real fluid systems in oil and gas production are practically non-conducting, non-magnetically active components. Real heterogeneous hydrocarbon systems, from the structural point of view, consist of an infinite number of microscopic local ion-electrostatic cores distributed in the volume of the dispersion medium. According to Cohen's rule, double electric layers are formed at the contact boundaries of components in contact (oil-gas, oil-water, water-condensate, etc.) in a heterogeneous system, and as a result, each real fluid system can be represented as a complex composition of a set of local electrostatic fields. The electrokinetic properties of this structure are characterized by a certain electrode potential. Prof. F.H. Valiyev called this potential the α-factor and came up with the idea that many natural and technological rheophysical processes (effects) are essentially electrokinetic in nature, and by changing the α-factor, it is possible to adjust the physical properties of real hydraulic systems, including thermohydrodynamic parameters. Based on this idea, extensive research work was conducted, and the possibility of reducing hydraulic resistances and improving rheological properties was experimentally discovered in real liquid systems by reducing the electrical potential with various physical and chemical methods.

Keywords : microcracked, electrode potential, hydraulic resistance, Newtonian fluid, rheophysical properties
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