Advances in Estimating Heavy Oil Viscosity from Magnetic Resonance Data

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Summary

Heavy oil production economics depend on several factors, one of the most important of which is oil viscosity. Borehole nuclear magnetic resonance (NMR) is routinely used to estimate the viscosity of light oil, even when it is mixed with water in the pore space of reservoir rock. However, commonly employed NMR viscosity estimation methods are inadequate when applied to Canadian heavy oil reservoirs.

Published correlations for estimation of heavy oil viscosity are not universally applicable since the results of NMR measurements in heavy oil depend on the properties of the oil and details of data acquisition and processing techniques. Thus NMR-viscosity correlations must be customized for specific data acquisition and processing details.

Application of customized viscosity relationships to borehole NMR measurements requires isolation of the oil signal from the total NMR signal. Methodologies for isolating the oil signal from the log data are discussed and Canadian log examples are used to illustrate the utility of the correlations.