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New petrophysical magnetic methods MACC and MAFM in permeability characterisation of petroleum reservoir rock cleaning, flooding modelling and determination of fines migration in formation damage

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Potential applications of magnetic techniques and methods in petroleum engineering and petrophysics (Ivakhnenko, 1999, 2006; Ivakhnenko & Potter, 2004) reveal their vast advantages for the petroleum reservoir characterisation and formation evaluation. In this work author proposes for the first time developed systematic methods of the Magnetic Analysis of Core Cleaning (MACC) and Magnetic Analysis of Fines Migration (MAFM) for characterisation of reservoir core cleaning and modelling estimations of fines migration for the petroleum reservoir formations. Using example of the one oil field we demonstrate results in application of these methods on the reservoir samples.

Petroleum reservoir cores samples have been collected within reservoir using routine technique of reservoir sampling and preservation for PVT analysis. Immediately before the MACC and MAFM studies samples have been exposed to atmospheric air for a few days. The selected samples have been in detailed way characterised after fluid cleaning and core flooding by their mineralogical compositions and petrophysical parameters. Mineralogical composition has been estimated utilizing XRD techniques. The petrophysical parameters, such as permeability and porosity have been measured on the basis of total core analysis. The results demonstrate effectiveness and importance of the MACC and MAFM methods for the routine core analysis (RCAL) and the special core analysis (SCAL) in the reservoir characterisation, core flooding and formation damage analysis.

References

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