Paper 6

Comparison of resistivity and capillary pressure approaches to determining water saturation from wireline log data

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Current resistivity log analysis for water saturation in the Malay Basin frequently overestimates water saturation in very silty and shaly reservoirs due to shoulder bed effects on resistivity tools and excessive resistivity suppression in highly laminated sands and silts. Simple resistivity forward modelling approaches are used to show the degree of water saturation increase due to these effects. Capillary pressure models offer an alternative approach to the resistivity models that circumvent much of the shoulder bed and laminated sand effect. These models are based primarily on nuclear log data which has better vertical resolution than resistivity log data and which responds almost linearly to changes in silt and shale content rather than highly non-linearly for resistivity data. The weakness of capillary pressure models, however, lies in the accuracy to which formation permeability can be estimated from log data. This paper will contrast resistivity and capillary pressure approaches by showing some examples from Seligi, Belumut and Angsi wells and will also present some new approaches such as magnetic resonance log data to improving formation permeability estimates.

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