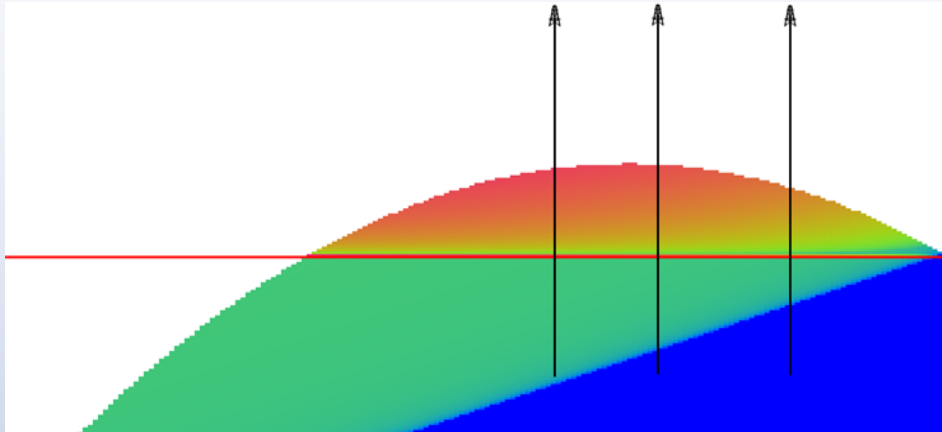


Short Talk

Modelling Imbibition Capillary Pressures



presented by

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BACKGROUND

Water saturations (S_w) in oil & gas reservoirs are controlled by capillary pressure and related forces in most cases. Wire-line logs can approximate what these water saturations may be, but do not actually measure S_w directly. Hence, when it comes to building reservoir models and estimating volumes in-place, capillary pressure based saturation-height models are used to describe S_w .

DRAINAGE & IMBIBITION

Most reservoirs are usually described using drainage saturation-height functions. However, there are situations where drainage modelling is unable to properly describe the log-derived water saturation observations. In these imbibition scenarios, reservoirs have been previously filled with hydrocarbons to a deeper level. These hydrocarbons have then moved away, either through reservoir breaching or structural movement, leaving a shorter column with residual hydrocarbons beneath the present Free Water Level. In other words, water has imbibed back into the interval below the present day pressure-derived Free Water Level.

OUTLINE

This talk will clarify the differences between drainage and imbibition in the reservoir and why these differences matter. It will then describe ways that imbibition capillary pressure curves can be measured and give an overview of suitable mathematical models to describe the observed behaviour.

Reconciliation between the derived models and actual wire-line logs will be illustrated by showing examples from around the world. The impact of changing from drainage to imbibition will be touched upon.

Finally, the talk will touch upon how imbibition saturation-height functions can be implemented in Petrophysical, Static & Dynamic models.

AUDIENCE

Although the author is a Petrophysicist, this talk is targeted at everyone involved in reservoir characterisation and modelling. Not only will Petroleum Engineering students and new Industry Professionals learn from this talk, but so will established Geologists and Reservoir Engineers. There are some valuable insights explained and observations made herein.

ABOUT STEPHEN ADAMS

Steve has been a Petrophysicist since 1987. Following training and an initial 7 years with Shell, he has worked as an independent consultant with clients in Australasia, Asia, the Middle East and elsewhere. He has also been providing petrophysically training since 2001.

Steve has 19 papers published and is well known in the industry as a Specialist in Saturation-Height Modelling. His 2016 book "Saturation-Height Modelling for Reservoir Description" has been well received by the Industry.

During his career, Steve has had a great deal of exposure to some challenging problems involving capillary pressure in different lithologies. Much of this work has been "leading edge" in that similar cases have not been described in the literature previously. Some of these examples will be referred to in the talk where the work has been published or permission has been otherwise received.