

Saturation Height Function @model

- [SHF capillary pressure model](#)
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- [SHF Cuddy model](#)
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SHF capillary pressure model

Physical method based on the following formula:

$$(1) \quad s_{wi}(h) = P_{cow}^{-1}[(\rho_w - \rho_o)g(h - h_{FWL})]$$

based on implicit solution of the constant pressure gradient equation:

$$(2) \quad (\rho_w - \rho_o) \cdot g \cdot (h - h_{FWL}) = P_{cow}(s_{wi})$$

where $\rho_o = \rho_o(T_i, p_i)$ $\rho_w = \rho_w(T_i, p_i)$ – oil and water densities at initial formation temperature T_i and pressure p_i .

This model requires reliable and representative data bank on [capillary pressure](#) at sandface conditions.

SHF Skelt-Harrison model

Empirical method based on the following formula:

$$(3) \quad s_{wi}(h) = 1 - a \exp\left(-\left(\frac{b}{h - h_{FWL} + d}\right)^c\right)$$

where model parameters $\{a, b, c, d\}$ are calibrated on water saturation from OH logs for each [lithofacies](#) or [petrotype](#) individually.

The coefficient c is related to [FWL](#) correction but usually set the same for all [lithofacies](#) / [petrotypes](#) of a given reservoir unit.

If core data is abundant then one can build a reasonable correlation of model parameters on porosity ϕ and/or permeability k_a :

$$(4) \quad a = a(\phi, k_a), \quad b = b(\phi, k_a), \quad c = c(\phi, k_a)$$

SHF Cuddy model

Empirical method based on the following formula:

$$(5) \quad s_{wi}(h) = \frac{b}{\phi} (h - h_{FWL} - c)^a$$

where model parameters $\{a, b, c\}$ are calibrated on water saturation from OH logs for each lithofacies or petrotype individually.

The coefficient c is related to FWL correction but usually set the same for all lithofacies / petrotypes of a given reservoir unit.

If core data is abundant then one can build a reasonable correlation of model parameters on porosity ϕ and/or permeability k_a :

$$(6) \quad a = a(\phi, k_a), \quad b = b(\phi, k_a), \quad c = c(\phi, k_a)$$

See also

[Physics](#) / [Fluid Dynamics](#) / [Percolation](#)

[Petroleum Industry](#) / [Upstream](#) / [Subsurface E&P Disciplines](#) / [Field Study & Modelling](#) / [Petrophysics](#) / [Saturation Height Function \(SHF\)](#)

[[Basic reservoir properties](#)]

References

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| 1 | SPE 71326, B. Harrison (Enterprise Oil), X.D. Jing (Imperial College, London), Saturation Height Methods and Their Impact on Volumetric Hydrocarbon in Place Estimates, 2001 |
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