Production Water Cut = Yw

Ratio of water production rate at surface q_W to liquid production rate at surface $q_L = q_O + q_W$:

(1) $$Y_W = \frac{q^{\uparrow}_W}{q^{\uparrow}_L}$$

It relates to Water-Oil Ratio (WOR) as:

(2) $$Y_W = \frac{1}{1 + q^{\uparrow}_O / q^{\uparrow}_W} = \frac{\mathrm{WOR}}{1 + \mathrm{WOR}}$$

The simplest way to model the production watercut Y_W in a given well is the Watercut Fractional Flow @model:

(3) $$\mathrm{Y_{Wm}} = \frac{1}{1 + \frac{M_{ro}}{M_{rw}} \cdot \frac{B_w}{B_o}} = \frac{1}{1 + \frac{k_{ro}}{k_{rw}} \cdot \frac{\mu_w}{\mu_o} \cdot \frac{B_w}{B_o}}$$

which provides a good estimate when the drawdown is much higher than delta pressure from gravity and capillary effects.

The model (3) can also be used in gross field production analysis and in this case the average reservoir saturation can be assumed homogeneous:

(4) $$s_w(t) = s_{wi} + (1 - s_{wi}) \cdot \mathrm{RF(t)/E_S}$$

This is a very simplistic proxy-model of reservoir saturation under an idealistic waterflood conditions and may mislead in specific cases.

The above model is very idealistic and has very limited applications.

In most practical cases it can only match the production watercut at late stage of the field lifecycle when it develops a fair waterflood sweep pattern and does not have thief production.

The most popular short-term production watercut models are given by the brute-force correlation with the flowartes Watercut Correlation @model.

See Also

Petroleum Industry / Upstream / Subsurface E&P Disciplines / Well Testing (WT) / Flowrate Testing / Flowrate

[WOR] [Watercut Diagnostics] [Watercut Fractional Flow @model] [Watercut Correlation @model]

[Surface flowrates] [Oil surface flowrate] [Gas surface flowrate] [Water surface flowrate] [Production Gas-Oil Ratio (GOR)]

[Waterflood Recovery (WF)]