PADE IPR @ model

One of the most general form of IPR model below bubble-point pressure:

(1) $$\Psi^n(p_b) - \Psi^n(p_{wf}) = (q/q_{\max} - q_b/q_{\max}) \left[\frac{1}{(1 - q_b/q_{\max})} \cdot \Psi^n(p_b) + (1 - q/q_{\max}) \cdot H(q) \right]$$

(2) $$H(q) = \frac{\sum_{k=0}^{m} a_k \, (q/q_{\max})^k}{\sum_{k=0}^{m} b_k \, (q/q_{\max})^k} = \frac{a_0 + a_1 \cdot (q/q_{\max}) + a_2 \cdot (q/q_{\max})^2 + \ldots + a_m \cdot (q/q_{\max})^m}{b_0 + b_1 \cdot (q/q_{\max}) + b_2 \cdot (q/q_{\max})^2 + \ldots + b_m \cdot (q/q_{\max})^m}$$

(3) $$p_b > p_r > p_{wf}$$

where

p_{wf}	bottom-hole pressure (BHP)
p_b	bubble-point pressure
q	sandface flowrate
$q_{\max}$	Absolute Open Flow (AOF)
$\Psi(p)$	pseudo-pressure function specific to fluid type
n	pseudo-pressure curvature
a	laminar flow coefficient
b	turbulent flow coefficient

It needs well tests at least three different rates to assess $\{a, b, p_r\}$ but obviously more tests will make assessment more accurate.

See also

Petroleum Industry / Upstream / Production / Subsurface Production / Subsurface E&P Disciplines / Field Study & Modelling / Production Analysis / Productivity Diagnostics / Inflow Performance Relation (IPR)

[Vogel IPR @model] [Richardson and Shaw IPR @ model] [Wiggins IPR @ model][LIT IPR @ model][PADE IPR @ model]

References

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