Definition specifics on formation pressure (Pe) and productivity index (PI)

Despite of terminological similarity there is a difference in the way Dynamic Modelling (DM), Well Flow Performance (WFP) and Well Testing (WT) usually define formation pressure and productivity index.

The most typical definitions (although they do not cover the full variety of definitions referred in petroleum literature) are summarised in the table below:

	Formation pressure, p_e	**Flowrate,** q	**Prod**
WFP	Drain-area formation pressure estimate within the drainage area A_e (1) $p_r = \frac{1}{A_e}\iint_{A_e} p(x,y,z)dS$	Surface flowrates: Oil surface flowrate q_O Gas surface flowrate q_G Water surface flowrate q_W Liquid surface flowrate q_L	Drain Produ J_r
WT	Drain-boundary formation pressure estimate along the boundary of drainage area A_e (2) $p_e = \frac{1}{L_e}\int_0^{L_e} p(x,y,z)dl$ where L_e is the boundary of drainage area A_e	Total sandface flowrate: $q_t = q_w + q_o + q_g$	Total Produ $J_t =$

DM	9-cell formation pressure (3) $$p_{e9,\,i,j} = \frac{1}{9}\sum_{k=i-1}^{i+1}\sum_{l=j-1}^{j+1} p_{k,l}$$ (4) $$p_{e9,\,i,j} = \frac{1}{9}(p_{i,j} + p_{i,\,j+1} + p_{i,\,j-1} + p_{i-1,\,j} + p_{i-1,\,j} + p_{i-1\,j-1} + p_{i+1,\,j+1} + p_{i-1\,j+1} + p_{i+1,\,j-1})$$ for each fluid phase individually: $p_{e9,o}$, $p_{e9,g}$, $p_{e9,w}$	Sandface Flowrates: Oil sandface flowrate q_o Gas sandface flowrate q_g Water sandface flowrate q_w	Sand Produ

Sometimes the wrong estimations of flowrate stem form the wrong inputs (J or p_e).

See Also

Petroleum Industry / Upstream / Production / Subsurface Production / Well & Reservoir Management

Subsurface E&P Disciplines / Production Technology / Productivity Index