Reservoir boundary flow condition @model

(1) $$\mathrm{F}_\Gamma(p, \mathbf{u}) = 0$$

where

Γ	reservoir boundary
p	reservoir pressure
$\mathbf{u}$	fluid velocity
$\mathrm{F}_\Gamma(p, \mathbf{u})$	some function

The popular form of the Reservoir boundary flow condition @model is:

(2) $$\mathrm{F}_\Gamma(p, \mathbf{u}) = \left[a \cdot (p(\mathbf{r}) - p_0) + \epsilon \cdot \mathbf{n} \cdot M \, (\nabla p - \rho \, \mathbf{g}) \right]_{\mathbf{r} \in \Gamma} = 0$$

where

$p(t, \mathbf{r})$	reservoir pressure	t	time
$\rho(\mathbf{r}, p)$	fluid density	$\mathbf{r}$	position vector
$M = k/\mu$	phase mobility	∇	gradient operator
k	formation permeability to a given fluid	$\mathbf{g}$	gravity vector
μ	dynamic viscosity of a given fluid	$\mathbf{u}$	fluid velocity
$\mathbf{n}$	external normal to the reservoir boundary Γ	$\epsilon \in \{0, 1\}$	a binary value

The two extreme cases of (2) are:

Constant Pressure	No flow
$p(\mathbf{r})_{\mathbf{r} \in \Gamma} = p_0 = \mathrm{const}$	$\mathbf{n} \cdot \mathbf{u} \Big\vert_{in \Gamma} = \mathbf{n} \cdot M \, (\nabla p - \rho \, \mathbf{g}) \Big\vert_{in \Gamma} = 0$

The other examples of Reservoir boundary flow condition @model are provided by Aquifer Drive Models and Gas Cap Drive Models.

See Also

Petroleum Industry / Upstream / Subsurface E&P Disciplines / Petroleum Geology / Reservoir boundary

[Infinite reservoir boundary] [Reservoir flow boundary] [Multiwell Retrospective Testing (MRT)]

[Aquifer Drive Models] [Gas Cap Drive Models]