# Total multiphase fluid mobility

A property characterizing agility of the fluid under pressure gradient as a ratio of reservoir permeability by dynamic fluid viscosity:

(1) $$M(s) = k_{air} M_r(s)$$

where

| | |
|---|---|
| $k_{air}$ | absolute permeability to air |
| $M_r$ | Relative Fluid Mobility |

In multiphase flow the concept of total fluid mobility is not well-defined as phases may have different mobilities and flow quite independently from each other, having different pressures, moving at different velocities and segregated in space.

But for relatively homogeneous multi-phase flow (phases may move at different velocities but occupy the same reservoir space and have the same pressure) the multi-phase mobility may be defined by Perrine model:

(2) $$\left\langle \frac{k}{\mu} \right\rangle = k_{air} \left[ \frac{k_{rw}}{\mu_w} + \left( 1 + \frac{R_s \, B_g}{B_o} \right) \cdot \frac{k_{ro}}{\mu_o} + \left( 1 + \frac{R_v \, B_o}{B_g} \right) \cdot \frac{k_{rg}}{\mu_g} \right]$$

and for the case of 2-phase Oil + Water fluid model (when Perrine model makes the most practical sense):

(3) $$\left\langle \frac{k}{\mu} \right\rangle = k_{air} \left[ \frac{k_{rw}}{\mu_w} + \frac{k_{ro}}{\mu_o} \right]$$

## See also

Physics / Fluid Dynamics / Percolation

Petroleum Industry / Upstream / Subsurface E&P Disciplines / Reservoir Flow Simulation

[ Field Study & Modelling ] [ Phase mobilities ] [ Relative Phase mobilities ]