Multihase 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 phase pressures, moving at different velocities and segregated in space.

In most popular case of a 3-phase Oil + Gas + Water fluid model with relatively homogeneous flow (phases may move at different velocities but occupy the same reservoir space and have the same phase pressure) the multi-phase mobility may be defined by Perrine model:

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

In case of 2-phase Oil + Water fluid model with regular to small values of R_s (when Perrine model makes the most practical sense):

(3)	$M = k_{air} \cdot [M_{rw} + M_{ro}]$	$\Rightarrow$	(4)	$\left\langle \frac{k}{\mu} \right\rangle = k_{air} \cdot \left[\frac{k_{rw}}{\mu_w} + \frac{k_{ro}}{\mu_o} \right]$

See also

Physics / Fluid Dynamics / Percolation

Petroleum Industry / Upstream / Subsurface E&P Disciplines / Field Study & Modelling / [Complex reservoir properties] [Basic diffusion model parameters]

[Petrophysics] [Basic reservoir properties] [Permeability] [Absolute permeability] [Relative permeability] [Wettability] [Phase mobility] [Relative phase mobilities]

[Linear Perrine multi-phase diffusion @model)]