

Reservoir Fluid Mobility

A property characterising agility of the reservoir [fluid](#) under [pressure gradient](#) and quantified as a value of [reservoir permeability](#) normalised by [dynamic fluid viscosity](#):

(1)

$$M = \frac{k}{\mu}$$

where

k	formation permeability to a given fluid (which vary for different fluids)
μ	dynamic fluid viscosity

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](#):

(2)

$$M = k_{air} \cdot \left[M_{rw} + \left(1 + \frac{R_s B_g}{B_o} \right) \cdot M_{ro} + \left(1 + \frac{R_v B_o}{B_g} \right) \cdot M_{rg} \right]$$

$\Rightarrow$

(3)

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

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):

(4)

$$M = k_{air} \cdot [M_{rw} + M_{ro}]$$

$\Rightarrow$

(5)

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

See also

[Physics](#) / [Fluid Dynamics](#) / [Percolation](#)

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