

Formation Volume Factor = FVF

Synonym: Formation Volume Factor = Formation Fluid Shrinkage

Ratio of fluid volume at subsurface conditions V_{sub} to fluid volume at reference conditions V_{ref} :

$$B = \frac{V_{\text{sub}}}{V_{\text{ref}}} = \frac{\rho_{\text{ref}}}{\rho_{\text{sub}}}$$

where ρ_{ref} is density at reference conditions and ρ_{sub} is density at subsurface conditions.

The reference conditions usually refer to SPE Standard Conditions (STP) but in some cases may refer to separator conditions.

It can be calculated via Z-factor as:

(1)
$$B = \frac{Z}{Z_{\text{ref}}} \cdot \frac{p_{\text{ref}}}{p} \cdot \frac{T}{T_{\text{ref}}}$$

It is related to fluid compressibility c as:

(2)
$$c = -\frac{1}{B} \cdot \frac{dB}{dp}$$

For the slightly compressible fluid the fluid compressibility is not dependent on pressure $c(p) = c = \text{const}$ and Formation Volume Factor has a linear dependence on pressure p with usually a very small gradient $c \sim 0 \Leftrightarrow c \cdot (p - p_i) \ll 1$:

(3)
$$B(p) = B_i \cdot [1 - c \cdot (p - p_i)]$$

where

p_i	some pressure point around which the dynamic process is happening
B_i	Formation Volume Factor at this pressure point

The FVF values are usually used to recalculate the fluid volumes measured at surface to the fluid volumes which are produced from or injected to subsurface reservoir.

The most popular FVF are:

Oil formation volume factor (Bo)	Gas formation volume factor (Bg)	Water formation volume factor (Bw)
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See Also

Petroleum Industry / Upstream / Subsurface E&P Disciplines / Fluid Analysis (PVT) / Dynamic fluid properties

[Oil formation volume factor (Bo)][Gas formation volume factor (Bg)][Water formation volume factor (Bw)]

