Capillary Pressure Correlations

Subtopics:

Analytical

Water-Oil System

$$p_{cow} = Coeff0 + Coeff1\,(1 - S_{wn}) + Coeff2\,(1 - S_{wn})^2 + Coeff3\,(1 - S_{wn})^3$$

$$S_{wn} = \frac{S_w - S_{wirr}}{1 - S_{wirr}}$$

where:

Coeff0 = capillary pressure coefficient 0

Coeff1 = capillary pressure coefficient 1

Coeff2 = capillary pressure coefficient 2

Coeff3 = capillary pressure coefficient 3

Gas-Oil System

$$p_{cgo} = Coeff0 + Coeff1\left(1 - S_{gn}\right) + Coeff2\left(1 - S_{gn}\right)^2 + Coeff3\left(1 - S_{gn}\right)^3$$

$$S_{gn} = \frac{S_g}{1 - S_{org}}$$

where:

Coeff0 = capillary pressure coefficient 0

Coeff1 = capillary pressure coefficient 1

Coeff2 = capillary pressure coefficient 2

Coeff3 = capillary pressure coefficient 3

Brooks Corey

The Brooks Corey model is widely accepted to calculate capillary pressure for relative permeability calculations. This model is a modified representation of Corey's model and represents the capillary pressure in a more general form.

Water-Oil System

$$p_{cow} = (p_{ce})_{ow}^{-\frac{1}{\lambda_{ow}}}$$

$$S_{wn} = \frac{S_w - S_{wirr}}{1 - S_{wirr}}$$

where:

$(p_{ce})_{ow}$ = oil-water pore entry capillary pressure

λ_{ow} = oil-water pore size distribution index

Gas-Oil System

$$p_{cgo} = (p_{ce})_{go}^{-\frac{1}{\lambda_{go}}}$$

$$S_{on} = \frac{S_o - S_{org}}{1 - S_{org}}$$

where:

$(p_{ce})_{go}$ = gas-oil pore entry capillary pressure

λ_{go} = gas-oil pore size distribution index