4.1.1. Brooks & Corey (1966)

May define for p_c-vs-θ or p_c-vs-S_w.

$$\theta = \theta_{w_0} + (\theta_s - \theta_{w_0})\left(\frac{P}{P_b}\right)^{-\lambda} \quad \left\{ \begin{array}{l} \theta_{w_0} = \text{irreducible water content} \\ \theta_s = \text{saturated water content} \\ P_b = \text{bubbling pressure} \\ P = \text{capillary pressure} \end{array} \right.$$

$$\frac{\theta}{\theta_s} = \frac{\theta_{w_0}}{\theta_s} + \left(\frac{\theta_s}{\theta_s} - \frac{\theta_{w_0}}{\theta_s}\right)\left(\frac{P}{P_b}\right)^{-\lambda} \Rightarrow S = S_{w_0} + (1 - S_{w_0})\left(\frac{P}{P_b}\right)^{-\lambda}$$

$$\underbrace{\frac{(S - S_{w_0})}{(1 - S_{w_0})}}_{S_e} = \left(\frac{P}{P_b}\right)^{-\lambda}$$

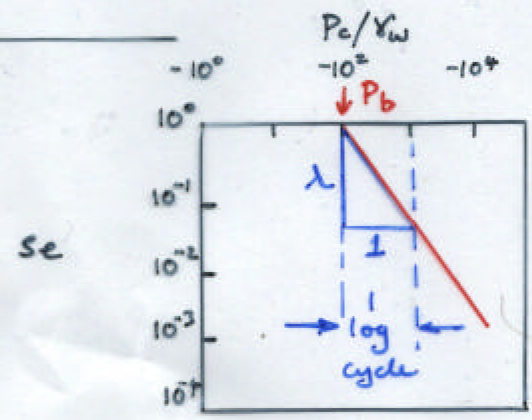
This is an empirical relation: $S_e = (P/P_b)^{-\lambda}$

$$\log S_e = -\lambda \log(P/P_b)$$

$$\log S_e = -\lambda[\log P - \log P_b]$$

Limiting conditions:

For $P \equiv P_b$ then $\log S_e = 0$; $S_e = 1$



λ↓ as broader pore throat distribut

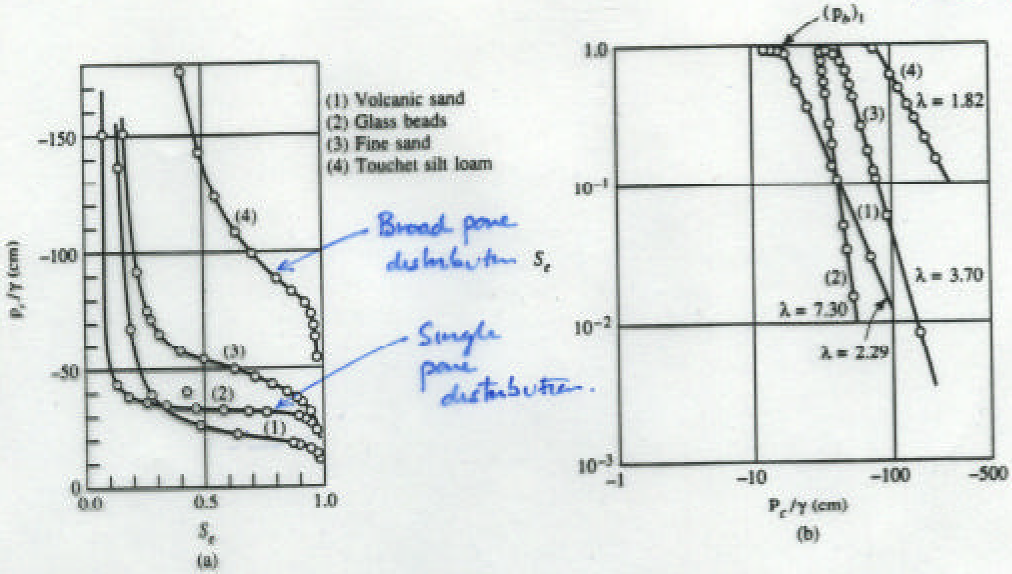


FIGURE 4.5 Capillary pressure head as a function of effective saturation for porous materials with various pore sizes. (a) Plotted on arithmetic paper and (b) plotted on log-log paper. *Source:* R. H. Brooks and A. T. Corey, *Proceedings, American Society of Civil Engineers, Irrigation and Drainage Division* 92, no. IR2 (1966):61–87.

BEHAVIOR DESCRIBED BY TWO PARAMETERS:

1) P_b – BUBBLING PRESSURE

2) λ – SLOPE OF GRAPH OVER 1 LOG CYCLE