Surface

Unsaturated zone $\psi < 0$

Two phase flow, parabolic non-linear equation

$$\frac{\partial \theta(\psi)}{\partial t} - \nabla(\kappa(\theta(\psi))(\nabla\psi + \mathbf{e}_z)) = f$$

Water table, not known a priori $\psi = 0$

Saturated zone $\psi > 0$

Single phase flow, linear elliptic equation

$$-\nabla(\kappa(\theta(\psi))(\nabla\psi + \mathbf{e}_z)) = f$$

Datum, $z = 0$