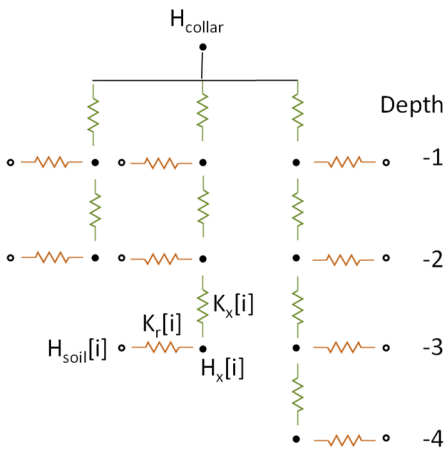
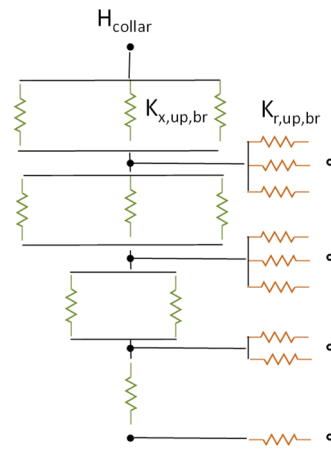


(a) Hybrid parallel-big root system



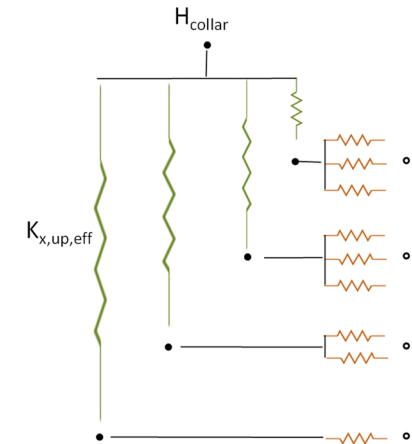
$$\mathbf{Q} = K_{rs} (H_{eff} - H_{collar}) \mathbf{SUF} + \text{diag}(\mathbf{SUF}) \text{diag}(\mathbf{K}_{comp}) C_7 (\mathbf{H}_{soil} - \mathbf{H}_{eff})$$

(b) Big root



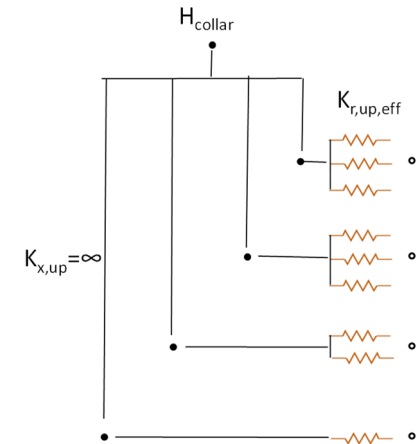
$$\mathbf{Q} = K_{rs,br} (H_{eff,br} - H_{collar}) \mathbf{SUF}_{br} + \text{diag}(\mathbf{SUF}_{br}) \text{diag}(\mathbf{K}_{comp,br}) C_{7,br} (\mathbf{H}_{soil} - \mathbf{H}_{eff,br})$$

(c) Parallel root with bottom-up parameterization



$$\mathbf{Q} = K_{rs} (H_{eff} - H_{collar}) \mathbf{SUF} + K_{rs} \text{diag}(\mathbf{SUF}) (\mathbf{H}_{soil} - \mathbf{H}_{eff})$$

(d) Parallel root with top-down parameterization



$$\mathbf{Q} = K_{rs} (H_{eff,Kx,inf} - H_{collar}) \mathbf{SUF}_{Kx,inf} + K_{rs} \text{diag}(\mathbf{SUF}_{Kx,inf}) (\mathbf{H}_{soil} - \mathbf{H}_{eff,Kx,inf})$$