**An explicit approach to capture diffusive effects in finite water-content method for solving vadose zone flow Federico**

Jianting Zhu, Fred L. Ogden, Wencong Lai, Xiangfeng Chen, Cary A. Talbot

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Talbot and Ogden developed the TO method to work around Richards’ Equation (Partial Differential Eq.) and model flow in unsaturated (=vadose) zone using an Ordinary Differential Eq. instead easier to solve, more feasible in hydrologic model, can use at larger, watershed scale. Here they add diffusivity to their model. They treat advection and diffusion separately (assumption, actually their effects are coupled). They find that TO+Diffusion produces more accurate water content profiles than just TO.

**Why it matters:** not very relevant, but part of the studies that seek a simple-to-solve, efficient and sufficiently accurate solution to the problem of water flowing in the soil (here unsaturated; our study neglects that, because we are more about saturated and water table oscillations). Values of sandy loam and other coarse soils might be of interest.

**See also, more important:** Ogden, F.L., Lai, W., Steinke, R.C., Zhu, J., Talbot, C.A., Wilson, J.L., 2015c. A new general 1-D vadose zone flow solution method. Water Resour. Res. 51, 4282–4300. http://dx.doi.org/10.1002/2015WR017126.

**Numerical Solution of Richards’ Equation: A Review of Advances and Challenges Federico**

Matthew W. Farthing, Fred L. Ogden

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Review of the many problems of Richards’ Equation (hard to solve, varying irregular soil, variables like hydraulic conductivity in unsaturated and capillary head can change very quickly in space, large gradients, instability, does not converge, boundary conditions hard to determine in practice) and techniques used to overcome and improve solution (most important: adaptive spatial and temporal discretization, i.e. increase resolution where things change the most).

**Why it matters:** just to provide a reference for Richards’ Eq. no need to say anything.