



Modeling saturation overshoot with continuum PDEs and discrete network models

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In uniform soils that are susceptible to unstable preferential flow, the water saturation exhibits a nonmonotonic profile upon continuous infiltration. This overshoot cannot be described by the conventional Richards equation. Here, solutions to the infiltrations using a popular nonequilibrium extension to the Richards equation are obtained using the traveling wave nature of the saturation profile. Quantitative comparisons are made to recent measurements of saturation overshoot. The nonequilibrium solutions can be made to fit the flux range of the overshoot, but the fit to the tip saturations is fair to poor at best. Experimental results are also compared to discrete network modeling of saturation overshoot. Comparisons are made between the continuum and discrete approaches to model saturation overshoot.