

Aspects of hysteresis in unsaturated porous media flow

Hans van Duijn

Darcy Center, Eindhoven University of Technology & Utrecht University, Netherlands (c.j.v.duijn@tue.nl)

About 20 years ago, Peter Raats and I wrote a technical note related to the horizontal redistribution in unsaturated porous media with hysteresis in the capillary pressure (P.A.C. Raats & C.J. van Duijn, A note on horizontal redistribution with capillary hysteresis, WWR 31, p. 231-232, 1995).

In the first part of my presentation, I will revisit the results of that paper. In particular the cases of unconventional flow, where the water flows from the dry region to the wet region. A comparison will be made with results obtained with the current interface area models as introduced by Gray & Hassanizadeh. I will explain and outline the differences.

In the second part, travelling wave solutions of Richards equation with gravity and with hysteresis in both the capillary pressure and relative permeability will be discussed. It will be explained why such solutions oscillate in space-time and how they behave as the hysteresis regularization vanishes.