Multi-time Step Technique for Solving the Richards Equation

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Abstract

Modeling the transport processes in a vadose zone plays an important role for a wide range of environmental issues. Water flow is governed by the Richards equation. Certain materials with dominantly uniform pore sizes (e.g. coarse-grained materials) can exhibit steep gradients of constitutive functions. Numerical approximation of the Richards equation requires sequential solutions of systems of linear equations arising from discretization and linearization of the problem. Typically, one has to solve huge systems of linear equations to obtain only a few updates of solution. Then the local updates typically represent local disturbances (e.g. moving wetting front). A method for adaptive subdomain split, that enables sequential solutions of subdomains covering the local disturbances only is currently under an intense development. The method was already labeled as *dd*-adaptivity, see Kuraz et al. (2015). Our recent presentation will focus on multi-time-step improvement of our *dd*-adaptivity algorithm.

References

1. M. Kuraz and P. Mayer and P. Pech. Solving the nonlinear and nonstationary Richards equation with two-level adaptive domain decomposition (dd-adaptivity). Applied Mathematics and Computation 267 (2015), 207-222.