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Nonlinear multigrid methods for numerical solution of saturated and unsaturated flow equation in two space dimensions

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The need of accurate and efficient numerical schemes to solve Richards' equation is well recognized. This study is carried out to examine the numerical performances of the nonlinear multigrid method for numerical solution of the two-dimensional Richards' equation modeling water flow in both unsaturated, and variably saturated porous media cases. The numerical approach is based on an implicit, second-order accurate time discretization combined with a vertex centered finite volume method for spatial discretization. The test problems simulate infiltration of water in 2D unsaturated and, respectively saturated-unsaturated soils with hydraulic properties described by Broadbridge-White and van Genuchten-Mualem models. The numerical results obtained are compared with those provided by the modified Picard-preconditioned conjugated gradient (Krylov subspace) approach.

Biography

Constantin Popa has completed his Ph.D. at the age of 39 years from University of Bucharest, Romania and postdoctoral studies from Weizmann Institute of Science, Israel (1996-1997) and Erlangen-Nurnberg University, Germany (2002-2003). He is professor on Applied Mathematics at Faculty of Mathematics and Informatics, Ovidius University of Constanta, Romania. He has published more than 40 papers in ISI journals and serving as an Editorial board/Scientific committee member of several journals/ international conferences.

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