Geophysical Research Abstracts,
Vol. 11, EGU2009-4190, 2009
EGU General Assembly 2009

Advances in high resolution 3D soil-root water transfer models

T. Schroeder (1), M. Javaux (2), J. Vanderborght (2), and H. Vereecken (2)

(1) Forschungszentrum Juelich GmbH, JSC, Juelich, Germany (to.schroeder@fz-juelich.de), (2) Forschungszentrum Juelich GmbH, ICG-4, Juelich, Germany (m.javaux@fz-juelich.de)

Soil and root systems increase in complexity due to advancements in modeling and experimental techniques. Accurate prediction of soil water potentials and velocity profiles using fine resolution soil grids lead to large computational times. One way of reduction of the computational time is the usage of grid refinement techniques. At locations were high water potential gradients are expected fine soil elements are created, whereas coarse elements reside elsewhere. This effectively decreases the number of soil elements to be used for model simulations and with that decreases the computational time. Moreover, the accuracy is maintained with respect to the solution of fine resolution grids.

Due to root water uptake high soil water potential gradients are expected around roots. Therefore we present a grid refinement method based on available root information that produces high accuracy grids, quickly. Two types of refinement methods can be used, static or dynamic refinement. Former method uses the total root structure to obtain a refined grid, latter only part of the root structure. Only root segments that are active and take up water are considered. The dynamic method is favorable because the soil water potential distribution changes over time. Furthermore, the refined grids are even less complex as the static approach and simulations cost even less computational time. Besides the decrease in computational costs the accuracy of both refinement methods is indeed maintained compared to regular fine grids that were used as a reference.