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Estimating soil moisture profiles along TDR rods

D. Bänninger (1), H. Wunderli (2), H. Flühler (2)

(1) Institute of Environmental Geosciences, University of Basel, Bernoullistrasse 30, CH - 4056 Basel, e-mail: (dominik.baenninger@unibas.ch) ; (2) Institute of Terrestrial Ecology, Soil Physics, ETH Zürich Universitätstrasse 16, CH-8092 Zürich.

We conducted a laboratory experiment to test the performance of a multi-slice-Debey model to retrieve water content profiles from TDR measurements. In the experiment we filled a 1.4 m height column with coarse sand. We installed a 100 cm long 3-rod TDR probe vertically in the column and measured the TDR traces while we continuously raised the water level from bottom to top. These traces are used to test the retrieval algorithm which yields the vertical distribution of the soil water content.

An important features of the retrieval algorithm is that the complex permittivities are sequentially adapted from top to down. The trace-end is not adapted until the upper part of the trace has been sufficiently optimized. We link the soil water content to electrical conductivity of the pore water using Archie's law. For the water content profile retrieval we make use of a layer peeling technique. We will present the results and discuss the accuracy of this retrieval algorithm.