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**Hydrology and Earth System Sciences Discussions**

# *Interactive comment on* "Evaluating models for predicting hydraulic characteristics of layered soils" *by* S. S. W. Mavimbela and L. D. van Rensburg

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Thanks to Anonymous Referee # 1 for the constructive comments and as a new comer in the field of soil physics I am encouraged to be more careful about my language, style and correct spelling of my citations. I would also admit that my understanding of HYDRUS 1D is still at infant stage. Coming to the Referees comments; I would concentrate to the highlighted main problems: (a) The description of the inverse analysis by HYDRUS 1D would be improved. (b) Regarding to the objective function; HYDRUS 1D offers about 15 options that could be included in the objective function of which the K($\theta$) at different pressure head is one of them. In our case the soil profile had



different horizons and measurements were taken at centre of each block. Therefore, it was thought appropriate to use the inter-block hydraulic conductivity and its corresponding pressure head as an objective function. Your suggestion is welcomed in this regard. (c) One think that distinguish HYDRUS 1D from the RECT program is its ability to discretize a one dimensional soil profile according to the layering sequence and composition of soil materials. For laboratory soil columns that are independent of each other the RECT program would be more appropriate. (d) Concerning the use of Darcy (1856) that was later to be known as the Bucking-Darcy Law. Its extension for unsaturated conditions by Richard (1931) is much easier to handle especially when the conservation of mass within the flow domain is of particular importance. Hillel et al (1972) successfully used the inversion of Darcy Law in estimation of K($\theta$) of layered soil profile using the IPM. (e) The use of 'K-coefficient' represented an abbreviated form of the unsaturated hydraulic conductivity. As a alternative the K($\theta$) relationship would now be used. (f) Yes! it would be interesting to compare the description of calculated hydraulic conductivity and retention curve using the optimised parameters from HYDRUS 1D. (g) For the sake homogeneity among the parameters of the different hydraulic models; the n- parameters was used instead of the $\sigma$ and $\alpha$ instead of h0 from the Kosugi model. (h) As for the rest of the comments they shall be given equal considerations when the suggested changes are made.

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