

Interactive comment on “SWRC fit – a nonlinear fitting program with a water retention curve for soils having unimodal and bimodal pore structure” by K. Seki

Anonymous Referee #2

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General comments

The paper presents a novel computer code for fitting parameters of soil hydraulic functions to measured soil water retention data. The special features of the code are that it is web-based and includes an algorithm for an automatic calculation of initial parameter guesses. The web-based program provides parameter estimates for up to 5 different soil hydraulic models (3 unimodal and 2 bi-modal model). Moreover, the author presents a novel multi-modal soil hydraulic model, which is a superposition of the uni-modal Kosugi model. The topic of the paper fits well within the scope of HESS, but the paper needs major revision. The largest weakness of the paper is that only very

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little substantial conclusions are reached. In large parts the manuscript is more a user manual than a regular paper (see p. 415-418). Although, the computer code does not provide confidence intervals or parameter correlations coefficients, which limit its use for scientific data evaluation, I am convinced that the computer code will be of interest to many HESS readers and is a helpful tool for a quick and easy fitting of soil water retention data to soil hydraulic models. Therefore, the availability of the code should be communicated to the scientific community.

Specific comments

The manuscript could be significantly shortened and tightened. The theory section is much too detailed and includes parts which do not give essential background information for an understanding of the paper. A derivation of the log-normal model of Kosugi (1996), for example, is not really necessary. A reference would be sufficient. The author should focus on the derivation of the novel soil hydraulic model. Figure 6 to 8 and Figure 9 to 11 should be merged. The structure of the manuscript could be improved. Here some examples: At p. 411, line 6, the author present results of a parameter fitting exercise before introducing the fitting program. The same problem occurs on p. 414, line 18-22. The results section starts with introducing the database for fitting. The database has to be introduced prior the results section. The results section should be renamed as "Results and Discussion" The conclusion section is mostly a summary. Rewrite! Add a conclusion to the abstract

Technical correction p. 407, line 2: We do not fit soil water retention curves to functions but to measured data. Rewrite!

p. 407, line 4-5: "which performs nonlinear fitting of soil water retention curves to 5 models" write "which performs nonlinear fitting of 5 soil hydraulic models"

p. 407, line 6-8: number the five models

p. 407, line 8: proposed

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p. 407, line 9: Which additional conditions are calculated by the program besides the initial guesses? Rewrite!

p. 408, Eq. 1: I think it would be better to use the water content form or the matric potential form of the Richard's equation. In my view in this way it becomes more obvious why both parameter functions are needed.

p. 408, line 25: The symbol $K(h)$ is not the unsaturated hydraulic conductivity but the unsaturated hydraulic conductivity function.

p. 409, line 1: critical -> crucial

p. 409, line 6: You introduced the symbol already in line 1

p. 409, line 15-16: Rewrite "it is the users' responsibility to give a good set of initial parameters to make the calculation" in " it is the users' responsibility to give a reasonable set of initial estimates"

p. 409, line 18-20: Rewrite "it would be more convenient if the program were to be responsible for making the initial estimate from the retention data and users would not have to input the initial estimate" as "it would be more convenient if the program would compute an initial guess for each parameter based on the measured soil water retention data"

p. 410, line 7: θ_e is usually defined as effective soil water content.

p. 415, line 3: Replace "compartments" with "components"

p. 419, line 4: Delete "... for the sample data ..."

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 407, 2007.

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