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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Predicting the soil water characteristic curve from the particle size distribution based on a pore space geometry containing slit-shaped spaces" *by* Chen-chao Chang and Dong-hui Cheng

Anonymous Referee #2

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General comment The paper deals with the estimation of soil water retention curve from soil particle size distribution, by means of a geometric model of pores allowing to link solid particle fractions to pore volume fractions. Such a topic can be of interest for some readers of HESS. The paper is concise and clearly organized. The English language is understandable, but would benefit of the help of a native speaker. Although the proposed pore space model is in the end as light modification of former models, the results obtained for a wide variety of soils seem good. Some minor issues should be addressed (see following detailed comments). Once done, I think the manuscript

could be published.

Detailed comments Equation (4) should be rewritten in a more general way, regardless of the units adopted for the water potential. In this regard, it seems that this equation is used to link pore dimension to water potential, even in the silt-shaped space between pores. This aspect should be better clarified, as the dimension of the silts are proportional to the pore diameter, so it is not clear what is the diameter introduced in equation (4) to obtain the corresponding potential. There is also another point, regarding silt-shaped spaces, that in my opinion deserves to be discussed in the paper. To my best understanding, silt-shaped spaces are introduced to consider the water which is bonded to the particles in such a way that the model of the bundle of cylinders fails in describing it. In fact, with such silts dimensions as small as 1 ïA■m are reached. In such a range of dimensions, capillarity is not anymore the mechanism which bonds water to the soil particles, and other kinds of interactions contribute to the potential energy of water (actually, already for quite larger pore dimensions). So, if equation (4) is still used, this turns out to be an effective, but not physically based, way to obtain water potential. Pag. 5, line 13. The water potential values should be negative. Pag. 9, lines 17-19. This statement sounds surprising, if I understand it correctly. The smaller the particles, the larger I expect soil (specific) surface area, as for instance for clay particles. In this respect, the authors should try (where possible), or at least mention the possibility of using measured surface areas rather than estimating it by means of an empirical formula, and discuss how their results could be (positively or negatively) affected. Pag. 10, line 21. The reference should read "van Genuchten, M. T." instead of "Genuchten, M. T. V.", and the same holds for where such a reference is recalled in the text.

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