Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2021-50-RC2, 2021

Comment on hess-2021-50

Anonymous Referee #2

Referee comment on "Evaluation of hillslope storage with variable width under temporally varied rainfall recharge" by Ping-Cheng Hsieh and Tzu-Ting Huang, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-50-RC2, 2021

Comment on hess-2021-50

This study applied both analytical and numerical approaches to solve hillslope hydrological dynamics equation, and tested (as well as compared) the results in some idealized situations. However, the manuscript was written more like a mathematic article though dealing with a practical problem in hydrology. Thus I think some major revisions are needed to meet the criteria of HESS. Please see my detailed comments as following.

Major comments:

Just as I mentioned, simulating the outlet discharge water of a hillslope is a practical hydrological problem. While many mathematic tools can be employed to solve the problem, the only metric to evaluate them is to compare their outcomes with some real observed measurements. However, this study stopped by testing its framework in some idealized conditions without checking with the real situation and data. On the other side, the topic of explicitly solving hillslope hydrology is not new. In fact, based on my knowledge, some land models have already employed the conception of hillslope and solve its hydrology dynamics explicitly using numerical solutions. These models have been tested and applied at different scales, and the observations are also available at different scales. So at such stage, conducting a similar research but only in idealized conditions is not decent for publication in HESS (maybe more suitable for a journal for applied mathematics). To overcome this shortage, the authors may consider using some real data to configure and evaluate their model, even at a local scale. Thus it can let us see more clearly the ability of each (analytical or numerical) methods and benefit future research. Please note that all required real data must be available as hydrological modelers have already depicted and validated the hillslope from local to global scales. So I see no excuse to refuse this suggestion.

Specific comments:

L41, "by means of isotope study": Please delete these words.

L77, "The ground surface is vegetation free, …": Please discuss the potential effects of vegetation.

L98, Equation (6): The n here should not be mixed with the n for drainable porosity.

L102, Equation (7): s/w=nh=bnD, because b<1, so h<D? But D is the average depth, how can h be less than its average everywhere?

L103, "where b is a fitting parameter …": Please show more detail for the method used in tuning b.

L194, Equation (37): Please show more detail how to use Taylor series expansion to transform the Eq (13) to the Eq(37).

L203-232: What is the major difference between this work and Torch et al. (2003, 2004)? The authors should particularly stress it in the manuscript because the similarity is too high in my view based on the current description.

L263: "Theta = 5%": Is the theta angle of slope? How to understand the symbol of percentage?