Interactive comment on "Cascade of submerged reservoirs as a rainfall-runoff model" *by* Jacek Kurnatowski

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Dear Professor Todini,

I am sincerely grateful for your review and very valuable remarks and suggestions. My comments to the issues raised by you please find as follows:

Field of application. Since the concept is (I guess) relatively new, till present I have had rather limited number of well-measured real field records to verify the wider scope of SC2 applicability. My intention was to analyze "at first glimpse" only mathematical assumptions and theoretical features of the solution and get in the meantime (next paper, maybe?) some more detailed knowledge on the practical effectiveness of the model as some possible applications I can only presage at the moment. I am convinced about the usability of SC2 at the baseflow analysis and can have a flicker of hope for other

cases, like subsurface of surface outflow even; however, I understand the possible needs of readers. Thus, I feel encouraged by you and shall follow your suggestion. Some further remarks I put forward while discussing "physical aspects" problem.

Behavior of the model under precipitation. Sure, the idea is brilliant and thank you again for this suggestion. I shall work it out using theoretical hyetographs, since real ones may create some additional problems like e.g. effective rainfall computing. I assume your prompt has referred to such cases, i.e. not only the Dirac impulse, but time-distributed rainfall intensities.

Physical aspects. Frankly, preparing submission of my paper I was thinking about the physical aspects description, but it seemed to be a little bit too risky for me. I was afraid (and still I am) of "playing to do a philosopher instead a hydrologist" since physical interpretation of conceptual models may lead sometimes to hazardous statements. Nevertheless, as I have mentioned above, now I feel to be more authorized by you to do so. The similarities of the SC2 assumptions to the groundwater flow, in particular to the Darcy law and Dupuit equation, are evident and this is my ground for the expectations about the model usefulness. I presume that some relations to the surface flow may be formulated as well, in particular at catchments with differentiated surface configuration.

Editorial issues. Figure 1 shows no real, calculation case, even for time t=0, if only the first reservoir in a chain is supplied by a rainfall, as you have mentioned. The colour filling particular reservoirs in this figure does not mean any real situation at any time and was applied by me only to denote the storage abilities of each of them. Of course, you are right – after reading the entire paper this figure seems to be irrational. I shall improve. Determinants – yes, better to use the notation "det| |"; double vertical lines may be confused with a norm applied in the functional analysis. Pi – sorry, my fault. Moving the mathematical derivation to an appendix – my first impulse was to set up a protest, but after some deliberations I cannot disagree. Discouragement of even one reader would be inexcusable. Please let me, however, wait for the Editor's standpoint.

Yours sincerely, Jacek Kurnatowski

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