Dear Editor, dear Referees,

Thank you very much again as for your kind attitude to my manuscript as for the comments and suggestions that inspired me to make essential improvements. Some of my explanations and feedback information I introduced in the frame of answers to particular reviews; nonetheless, in the light of significant amendments being made by me I shall repeat and update them, if necessary.

General remark beyond the reviews: in the meantime I succeeded in the full analytical solution of the problem for any numbers of reservoirs. Although the derivation is not very short, I decided to show it, moving at the same time the major part of the analysis (together with this derivation, of course) to Appendix A, according to Prof. E. Todini's suggestion. This entailed the change of the Table 1 content – numerical values instead analytical ones.

Answer to Prof. Todini's review:

Field of application. Thanks to your suggestions, now I am much more convinced about the usability of SC2 not only to baseflows but to surface flows as well. This became apparent after making the analysis of superposition of recession curve and the time-distributed rainfall, due to your suggestion. Anyway, even after this analysis I am still rather restrained in formulation of applicative hypothesis; should rather do it on a basis of experiments with field data. Since my manuscript was destined to be a first step on a new way (not blind, I hope) to the conceptual models development, practical effectiveness of it can be confirmed (or invalidated) later, after gathering a sufficient set of model identifications results.

Behavior of the model under precipitation forcing. The relevant calculations have been done and the result shown in Fig. 10. To be honest, this result was an unexpectedly positive surprise to me, so thank you very much for this remark.

Physical aspects. The relevant sub-chapter was added as I have been encouraged by you to do this. On the other hand, I put it with some restraint as I am rather reluctant to go too far with the analogies between conceptual models and e.g. hydraulic behavior of a catchment. Nevertheless, I am grateful for this suggestion.

Editorial issues. Figure 1 – I presume the present state of this figure is more clear since it is reflecting the possible real situation now and not the general idea only. Determinants notation – done. Pi – done as well, of course. Appendix A has been added and a part of mathematical derivation moved to it, as mentioned before.

Answer to the Anonymous Referee #2:

Applicability to a raster-based spatially distributed catchment. The applicability of the model is limited, of course, since there is no conceptual rainfall-runoff model reflecting each and every situation within any catchment. I can see the proper way of acting as follows: first of all, after formulation of theoretical foundations, the model should be tested with small catchment, where the problem of spatially distributed features is important for neither rainfall nor morphological parameters; next, greater catchments modeled by now with classic conceptual models should be discussed. Large, spatially differentiated catchments are, in my opinion, the last phase of the model testing. Independently, the model should be tested as a branch (or even both branches) of the Diskin model.

Hysteretic response patterns. As I wrote in my first answer, I am of opinion that hysteretic behaviors do not require an application of non-linear models in every case. Sometimes hysteresis can be modeled by making the model parameters, like e.g. storage coefficient, varying in time; then the non-linear process can be perceived as a chain of quasi-linear processes, discrete in time, simplified in relation to a real situation, but meeting the accuracy requirements.

Sensitivity analysis. Thank you very much for this remark. I performed calculations of the storage coefficient influence upon the peak flow and lag time and made relevant supplements. The results confirm, in my opinion, the usefulness of the model.

Non-integer number of reservoirs. The Nash cascade allows us to apply the non-integer number of reservoirs by replacing the factorial of the integer number by the gamma function. Unfortunately, due to the fact that the output in the SC2 model consists of linear combination of different exponential functions and not only one function as in the Nash model, I cannot see the possibility of a generalization similar to the case of Nash model at present. On the other hand, the relations between peak values, lag times and storage coefficients can be expressed as functions of continuous variables, so the first step towards this goal has been achieved and I do not intend to prejudge all the possibilities of the model at this stage of development.

Language. I can only express a hope that this version is a little bit more polished up in this regard.

Again, thank you very much for your time spent on my manuscript.

Sincerely yours,
Jacek Kurnatowski