Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-393-RC2, 2017

Hydrology and Earth System Sciences
Discussions
Open Access

Interactive comment on "Ensemble modeling of stochastic unsteady open-channel flow in terms of its time-space evolutionary probability distribution: theoretical development" *by* Alain Dib and M. Levent Kavvas

Anonymous Referee #2

Received and published: 12 September 2017

In this two-paper series the authors present a model of the probability distribution of relevant hydraulic quantyties,i.e., water depth and water discharge, along a regular (rectangular) channel under transient flow conditions and for a random roughness (Manning) coefficient. Flow is assumed one-dimensional and governed by the classical de Saint Venant equation with a spatially uniform and normally distributed Manning coefficient. The contribution is splitted into two manuscripts, the first one reporting the derivation of a differential equation for the PDF, under the form of the Fokker-Plank Equation (FPE), and the second presenting an illustrative example. The first consid-

eration I have, after reading carefully the two manuscripts, is that this work would be better communicated if merged into a single contribution. The first manuscript does not stand alone because the theoretical derivations are not novel, but an application of a theory already presented in a previous publication by Kavvas (2003). Also the numerical technique proposed to solve the FPE equation is not new, rather an adaptation of the numerical scheme proposed by Chang and Cooper (1970). On the other hand, the second manuscript describes an idealized application with a regular rectangular channel and a triangular hydrograph at the upstream section. In my view, these two manuscripts can be easily merged into one, by transferring some long expressions of the first manuscreipt into an appendix and removing the first 5 pages (out of 13) of the second manuscript, which summarize what was presented in the first manuscript.

In the first manuscript the authors present a general form of the differential equation for the PDF (Eq. 19), based on theoretical developments presented in a previous paper (Kavvas, 2003. This expression contains autocovariances and cross-covariances of the state stochastic variables and is further simplified by introducing a number of assumptions as expressed by Eqs (20) and (22). These assumptions are in part supported by a previous study (Eq. 20), but some of them have been introduced without justification, other than mathematical convenience. The validation of these hypotheses is left to the comparison with Monte Carlo simulations, which is presented in the second manuscript. This further suggests the opportunity to merge the two manuscripts into one. Assuming that sufficient justification for the the assumptions of Eq. (20) can be found in a previous paper, as declared by the authors at page 11, the assumption (22) seem rather extreme since it implies zero correlation (and autocorrelation) between the stochastic variables for time lags larger than 0. This looks a rather strong assumption considering the diffusive nature of the De Saint Venant equation. In other words, this hypothesis implies that α and β (Eqs. 13 and 14), for example, are two independent white noises. Given the expressions (13) and (14) this hypothesis translates to both velocity V and the celerity c, which become white noise as well, while one expects these quantities to be correlated, and cross-correlated. More convincing arguments are needed here than the simple hypothesis, not supported by evidences, that the stochastic variables have short memory (page 11, line 17).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-393, 2017.