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

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In this manuscript the authors present an illustrative example of the Fokker Planck equation associated to the De Saint Venant equation for a spatially uniform but random roughness coefficient. As I already commented in my review of the previous manuscript I think that the material is not enough to justify a two-paper series. Therefore, my suggestion is for merging the two manuscripts into one. The first part (up to page 5) of the second manuscript summaries what already presented in the first one and is not longer needed in the merged manuscript, while the second part can be easily merged

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Discussion paper

with the first manuscript.

In addition, I have the following concerns on to the illustrative example discussed in this second manuscript.

The boundary condition used at the lower end of the channel in the solution of the de Saint Venant Equation in a Monte Carlo framework are unclear and should be better specified and justified. At page 7 line 12 I read "... while at the downstream end, the channel was assumed to be hydraulically long so that the flow can be taken as normal flow, thus satisfying the Manning's equation". This sentence is unclear: what is normal flow? Mathematically the downstream condition can be of imposed water depth y, with the velocity V obtained through the Manning's equation, or imposed velocity (or water discharge) and again the Manning's equation provides the water depth. The imposed condition can be either stationary, i.e. constant, or transient. It seems from the results that the authors choose the second option (Figures 2, 3 4 and 5 shows that the ensemble mean of both y and Q changes with time at the lower end of the channel), but no details on the specific boundary conditions are provided in the text. Assuming that one of the above two boundary conditions have been selected at the lower end of the channel, this choice should reflect to the boundary condition for the stochastic variables in the FPE equation. For instance, if y is imposed its PDF is a Dirac delta, while the pdf of the velocity is related to the pdf of the roughness coefficient through the Manning's equation. In turn, the PDFs of α and β depends from the PDFs of y and V through equations (13) and (14) of the first manuscript. Similar arguments can be applied if the BC is of imposed water discharge (i.e. velocity) and the water depth is computed through the Manning's equation. What puzzles me is that the authors impose a reflection boundary at the end of the channel (line 15, page 8), which is apparently not compatible with the previous conditions and with those imposed in the MC simulations. Since Figures from 2 to 5 show clearly that the water wave interacted with the downstream boundary, I am expecting that the boundary condition here should have an impact on the solution. This reinforce the need to select compatible boundary conditions in both models. In addition, given the boundary condition of the FPE at the initial section I was expecting here the standard deviation of the water discharge equal to zero, as in the MC simulations. However, this is not the case, as shown in Figures 8 and 9. This unexpected result needs justification.

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