Dear authors,

> Thanks for the detailed responses to my comments and observations. The article is better than the first version, especially in terms of writing and clarifications. I enjoyed reading it and analyzing the results.

I still think some aspects of the CFD implementation and description in the article are still missing or need more clarification in the text (some are well explained in the responses). Also, some comments were not addressed, but the response said they were. For example,

line 78: "In the flume experiment of Zhang et al" In that article there is more than one, so using "the" is incorrect here.
Removed.

but (new) line 96 says:
"in the flume experiment of Zhang et al. (2020)"

This is just an example, but this happens in other parts too.

My primary concerns are related to the CFD implementation and the impacts that it may have on the results, especially in the magnitudes of the variables. The following three points summarize this:

1) The complete paper is constructed around the results of highly diffusive numerical schemes. They are first order in all cases and impact the magnitude of every single variable, especially those related to forces and turbulence. The authors tried to justify this in line 578 saying: "The RNG k-ε turbulence model and first-order momentum advection were applied in the CFD simulation. Such settings ensured the computational stability for the flow over the highly complex bed surface of a step-pool unit but could only provide time-averaged results"
While it is true that the configuration will be more stable, the results are impacted by this setup. This should be acknowledged in the paper. As it is now, it seems to be an advantage rather than a loss in accuracy. For CFD studies, we want second order accuracy in any simulation.
The problem with first-order accuracy is that we don't know if the magnitudes are under or over-estimated (most likely underestimated because velocity fluctuations almost disappear).

2) As expressed in the first review, the distance between the inlet and the first step is (based on the figures) 10 to 20 cm. Boundary conditions are critical in a CFD simulation. A short distance with a uniform velocity profile does not represent the inlet of a step-pool unit. The authors justify this by mentioning the work of Wohl and Thompson (2000), but they had developed turbulence when working in the field. Also, adding 2 to 5 cm is still not enough. I mentioned this because I have experience simulating step-pool sequences using LES and noticed that the flow variables in the first unit are different than the 2nd and 3rd. Actually, the first unit may not be used to calculate average properties because it is the one that helps in developing the flow structure in the subsequent units. Then the authors said that "This is supported by the fact that the streaky coherent structures already formed at the downstream of protruding grains upstream of the step in this study". This is not an accurate statement because it is a result of the model. You will always have some flow structure, but you can only determine if it is valid if you have measurements.

3) There is only one step-pool unit in the experiment. This is not representative of reality because they are sequences most of the time.

So, when considering the cumulative effects of the different experimental configurations, 1st order + boundary conditions + single step-pool unit, I don't know if the results are a good representation of what was happening in the actual experiment.

I believe all these three points must be acknowledged and explained earlier in the article and not leave them for a small discussion at the end of the text. I would place them in section 2. This is a good study and will certainly be a reference for future studies, so these simplifications and decisions must be highlighted. Subsequent studies can identify these gaps and improve upon them. There are no problem by saying that simplifications have been done, actually that would be an advantage because they can be clearly identified.

Finally, some responses are very useful but were only included in the line by line responses and not in the actual article. For example, the comment about convergence criteria, boundary conditions for k and epsilon, etc. Make sure that the answers are included in the text too. My comments are intended for the general audience.