**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "A dynamic rating curve approach to indirect discharge measurement" by F. Dottori et al.

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The authors are to be congratulated on a well written, engaging and almost encyclopaedic treatise on flow measurement in natural channels, using the 1-D gradually varied flow equation; ('that's neat, why did I not think of that?'). Clever. The experienced hydraulician reader is taken through the development in enough detail to inform but not so much that one is overwhelmed. The introduction of the error analysis is effective and minimalist, giving confidence in the results reported in the text, tables and figures which are all essential; it was this error treatment which shows a thorough understanding of the matter at hand.

The paper should be accepted with some minor adjustments, which I detail below. The annotated pdf is being sent to the editor for onward transmission to the authors.

Congratulations.

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The following points need to be attended to:

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863: Eqs (1) & (2) the use of 'y' and 'z' is not clear in the context of their definitions; in Appendix A, y and z are given as 'water stage' and 'water surface level' respectively. I believe y should be water depth and z (in this context) water surface level relative to some datum, which by definition (in Section 25.1 of the Handbook of Hydrology edited by David Maidment), is how 'stage' is defined. To add to confusion, in Figure 2, H is defined as hydraulic head and h as stage. Because all the formulae have different geneses, it would help if a definition sketch were included in the Figures, defining the relevant variables and the formulae interpreted consistently with them.

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865: 13

I have a problem here. Either m is the ratio of c/U for the Manning equation in the case of a wide rectangular channel, or the exponent of the hydraulic radius [A/P] in the Chezy equation is 1/2, not 5/3.

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881: 1

The following paragraph is too long and not clear - I can make no suggestions to repair it. Please separate the ideas into shorter sentences:- 'As opposed to the case of the steady-flow rating curve, a parameter of which controls the curvature of the rating curve, the parameter of DyRaC is the roughness coefficient, which more or less allows to move up and down the rating curve, while the curvature, which is fundamental when extrapolating beyond the range of measurements, is only driven by the cross section

geometry, which is known.'

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881: 9

what does the following phrase mean? ' ... which influence is practically eliminated in the calibration phase.' It seems this idea has not been discussed before its appearance in the Conclusion.

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Fig 3.

The case numbers and the shading do not coincide, which is difficult to decipher. Please re-order - also in Figure 4. It would help the reader if the equation numbers were included on the caption: e.g. "Henderson (3)" to prevent confusion - it's not too clumsy ..

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Fig 5.

I cannot 'see' 'Chow & DyRaC' in this and the next few figures (presumably they coincide almost exactly with the 'true' curves. Only when we get to the irregular channel are the points distinguished by circles. Otherwise make the comment that they are indistinguishable. Is the rising limb really 24 hours?? Looks more like 12 .. Is the time right? days? here and in the next few figures

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The rest are minor textual adjustments appearing in the commented pdf.

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Geoff Pegram

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Please also note the Supplement to this comment.