Ocean Science

Discussions

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Interactive comment on "Frictional interactions between tidal constituents in tide-dominated estuaries" *by* Huayang Cai et al.

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review by D.G. Bowers

This paper deals with numerical modelling of several tidal constituents propagating in an estuary. This is an important problem: estuary models tend to deal with a single constituent at a time (to keep the run length down). However, the friction felt by that constituent will depend on the size and nature of the other tidal constituents in the estuary. The paper is thorough: the problem is first dealt with in an analytical way, numerical solutions are obtained and compared to observations in two estuaries in the Iberian peninsula. Agreement is good.

I'm not a numerical modeller but I know that the effect of frictional interaction between

different tidal constituents has been well studied (the important papers on the subject are referenced here). I would appreciate being told exactly what is new about this paper. Is it the first time that estuaries with an exponential shape have been considered in this way? Also, I would be interested to know if the problem could be approached just by matching model results to observations to get the best fit (as I suspect many modellers would do) without worrying too much about the theory.

The paper is well written, but it is long and technical. I don't suggest doing anything about it now, but Iw ould encourage the authors to go for a more concise style in the future. Having said that, I found myself wondering why the estuaries behave as they do. WHy does the tidal amplitude first reduce before increasing towards the tidal limit. I think I undesrtand that, but it would be interesting to read the authors opinion in the discussion section.

There were some small points I noticed which ould benefit from correction:

line 83 the storage width B_s is not defined here as far as I can see, although it is defined in the figure. At this stage I am confused about whether the model considers just a rectangular channel (with constant width) or whether the width is allowed to change with the tide.

line 115 Why would there be different celerities for elevations and velocities?

equations 10 and 11 it looks line - signs occur where there should be = signs (although that may be a trick of PDF).