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Hydrology and Earth System Sciences Discussions

Interactive comment on "Optimisation of LiDAR derived terrain models for river flow modelling" *by* G. Mandlburger et al.

G. Mandlburger et al.

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First of all, we'd like to thank referee #1 for the encouraging comments concerning our article.

Some remarks concerning the specific comments of referee #1:

> optimum values for angles, aspects ratio and expansion ratio

These values are reported in Ferziger and Peric, 2002. We have cited this reference at the beginning of the paragraph, but perhaps we should make clear that also the numbers (eg. optimum expansion ratio=1.2) are taken from this reference.

> quadrilateral surface elements

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Interactive Discussion

Discussion Paper

Most hydrodynamic-numerical models, working on unstructured grids, support polygonal surface elements (triangles, quadrilaterals, hexagonals, etc.). Hereby, surface elements with more than 3 vertices don't need to be planar. In the special case of quadrilateral elements, the 4 edges are the boundary of a hyperbolic paraboloid (HP-surface). We can clarify this in our text.

$>$ model calibration

For this article, it was not our goal to calibrate and validate a 2D-hydrodanamic-numerical model but rather to show the impact of geometry details as provided by LiDAR on the modelling results. We have tried to point that out on page 3618 (last sentence of chapter 5), but your comment tells us that we should highlight this point more clearly.

We chose HQ100 (470m3/s) for our simulation because it is the most importat design dicharge for flood zone mapping in Austria (as pointed out in the article). No calibration information (flow velocities, water levels, flood boundaries) is available for HQ100. Concerning the mentioned catastrophic flood of 2002, orthophotos are available, but only for the first peak featuring a by far higher discharge of 800m3/s.

Some notes concerning our choice of the overbank roughness: According to published reviewing studies on roughness coefficients (Habersack, 1995), we selected n=0.04 for characterising the overbank areas. This value characterises grassland and/or undisturbed surface terrains (Habersack, 1995). Normally, calibrated two-dimensional hydrodynamic-numerical models for hundred-year floods exhibit very high roughness (e.g. 0.2) for settlements (ARGE Kamp, 2005), but in our study the loss in energy (e.g. secondary currents) will be calculated based on the high quality DTM data and has therefore not to be considered in the summarizing roughness n-value.

additional references: ARGE Kamp. (2005): Machbarkeitsstudie Hochwasserschutz. Studie im Auftrag der Niederösterreichischen Landesregierung. Habersack, H. (1995): Praktische Anwendung der HEC-Software. ÖWAV Seminar Mathematische Model-

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lierung offener Gerinne, Band 17, Konstruktiver Landschaftswasserbau, TU Wien.

Some remarks concerning technical corrections:

> dec-imation

Our LaTeX source does not contain this hyphenation. So it must have to do with the production system. We will take special care for final proof reading.

> angles less than <

Thanks's for that.

>v(nue)0

Yes, it is a basic viscosity term. In the applied Hydro_AS-2D model nue0 is used to ensure numerical stability. In general, different nue0-values can be assigned to each cell, but in pratice, nue0 is only adapted in sections. Anyway, in our case we did not use nue0 adaptions at all.

> naming of geometries

It was intentional to name the geometry variants in the same way as the sub-figures. Anyway, this might not be as intuitive as we thought. It is a good idea to use geometry I and II instead of (a) and (b). We will adapt this part of the manuscript.

> figure 2

Ok. We will consider that.

> figure captions

We have provided captions for every figure and the online document at http://www.hydrol-earth-syst-sci-discuss.net/5/3605/2008/hessd-5-3605-2008.pdf does contain the figure captions 4-7.

> size of figures 5-7

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Interactive Comment

We agree with you concerning figure 5 (the computation meshes). On the other hand, we think, that the important contents (differences in flood extents and flow velocities) are well reflected in figure 6 and 7. We think of improving figure 5, either by showing a detail within the figures 5a and 5b, or by enlarging the entire figure as you have proposed it.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 3605, 2008.