Hydrol. Earth Syst. Sci. Discuss., 8, C4594–C4597, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C4594/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Study of frequency pattern of coherent turbulent flow over ripples using image processing with implication in river restoration" *by* A. Keshavarzi et al.

A. Keshavarzi et al.

alireza.keshavarzi@uts.edu.au

Received and published: 25 October 2011

Interactive comment on "Study of frequency pattern of coherent turbulent flow over ripples using image processing with implication in river restoration" by A. Keshavarzi et al. Anonymous Referee #1 Received and published: 21 October 2011 Study of frequency pattern of coherent turbulent flow over ripples A. Keshavarzi et al. 2011 Referee report (8, 7845–7871, 2011)

I have a few but major concerns on this work. Originality: ADV experiments with fixed bedforms and quadrant analysis are common in the literature and I fail to capture the

novelty of this specific contribution also in view of the following contributions by one of the author Mianaei and Keshavarzi;

Response:

In this study, the ADV measurements were performed not only with a fixed bed but also with a mobile bed. Using image processing to detect the number of particles along the ripples also provides valuable information from this study (Section 3.3). Furthermore, to the writers knowledge there are limited publications investigating the number of entrained/deposited particles with phase probability of coherent turbulent flow along the ripple structure. The linkage of sediment particles and phase probability is an extension of the work previously published by Mianaei and Keshavarzi

Boundary conditions: the incoming flow approaching the first ripple is different from the flow approaching the second ripple and as well different from the incoming flow with a uniform distribution of ripples (typical case in rivers). I am questioning if the two ripples case is relevant in general and for river restoration in particular.

Response:

There is a need to develop experimental techniques and analysis methodologies. It is the belief of the authors that the two ripple case provides adequate complexity for this task. It is acknowledged that there is a challenge ahead concerning the required length for production of uniform flow over the ripples, therefore the present work will be followed by a detail study on a series of ripples. It is the latter project work that will be more related to the practice of river restoration.

Some minor comments: I assume the base of the ripple is fixed: please specify in the text. If this is the case, since the ripples modulate the shear stress distribution, how is it possible to ensure that there is always a layer of sediment covering the ripples? In the fixed bed configuration obviously there is no problem, but how about the movable bed? Is there a threshold on the number of entrained particles (fig 10) the ripple can

sustain? In other words, the experiment allows only a limited erosion (or not?).

Response:

The entrainment of sediment particles was at the beginning stage of initiation of motion, therefore only a limited number of entrained particles occurred and this did not change the ripple form.

The Kolmogorov scale cannot be estimated properly by sampling at 50Hz. I am not sure how this scale was estimated. Please explain or remove from the table.

Response:

The authors acknowledge the issues associated with the estimation of the Kolmogorov scale. This parameter was included in Table 1 at the request of a pre-publication reviewers. It can be deleted from the table with no loss of information.

Fig 7 : please outline the ripple location on each panel

Response:Please see figure 3 for the ripple location.

Image methods: under each particle that leaves the image there has to be another particle that "appears as new" in the next image , how do you distinguish between those that actually enter the observation volume from those that were just hidden underneath? A brief description of the image analysis method would be important.

Response:

The image processing technique has been described in detail by Keshavarzi and Ball (1999). An application of image processing in the study of sediment motion, J Hyd. Res., 37(2), 559–576.

Citation suggested: Colombini M. Stocchino A., Ripple and dune formation in rivers J. Fluid Mechanics Volume: 673 Pages: 121-131 (2011)

Response:The authors are happy to add a citation to this paper. However it is noted

that publication of this paper was post first submission.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 7845, 2011.