RE: NHESS 2016 340 Xiangping et al. Debris flow sediment control using multiple herringbone water-sediment separation structures

Overview

The authors present an experimental study on the capacity of a typology of filtering structures of retaining sediments. Main deficience is that no dimensional analysis is previously carried out. The results are only analysed on the base of ratios between characteristics grain size and the opening widths of the proposed structures. Therefore, authors should, initially carry out a dimensional analysis of the phenomenon to determinate the parameters to investigate. Moreover, the characteristics of the initial debris flow, that should be in uniform flow conditions, are missing as the slope of the bed. In the paper it is only written that the water flowing from an upstream tank washed out sediments that fill the channel. As written before, interaction phenomena between a solid-liquid current and a structure depend also, on the kinematic and dynamic characteristics of debris flow as flow velocity, flow depth, solid-liquid volume and sediments concentration (as also the authors claim at line 27 at page 2). Moreover, experiments were carried out using an unique slope of the channel. Dimensional analysis helps in determining the parameters controlling the phenomenon and relate them to the geometrical and dynamic scales of the experiments so that results can be used for prototype studies. The authors, in fact, present their experimental work as a study on hydraulic model and the hydraulic model requires dimensionless analysis. If this is missing the experimental works are only simple experimental tests that in absence of scales (geometrical,…..) and slope cannot be used for designing a prototype. For the reasons above this work is not suitable to publication.

The following are the detailed comments and specifications.

1. Page 1 – line 12: use “could” instead of “should” and add “by reducing the solid content” after mitigation.
2. Page 1 - line 12: without dimensionless analysis, the form “model hydraulic tests” is not appropriate and experimental tests should be used; the authors should also provide some information on the experiment facilities and experiments.
3. Page 1 - line 30: please add also the works of Watanabe et al. (1980), Ikeya (1989), Johnson and Richard (1989) and Lien (2003) in the references.
4. Page 2 – line 21: insert “after each event” after “fields”.

5. Page 2 - line 29: “consideration of these variables is necessary” should be substituted with “these variables must be considered”.
6. Page 3 – Figure 1 caption: replace it by “A M-HWSS system with a single HWSS in enlarged scale on the bottom right side “.
7. Page 3 - line 3: substitute “research” with “tests”; the sentence ”that structures parameters….single structures” is unclear.
8. Page 5 – lines 6-7: please associate to each grid model Gi the corresponding grid opening ; moreover, which are the main parameters?
9. Page 5 – Figure 3 caption: add “view” after “schematic”.
10. Page 6 – line 8: 200% slope? It means a bed slope angle of 63.4°. Has it really sense?
11. Pages 8-9 – equation (6): what are m_{tki} and λ_i? I suggest a better use of symbols because the text, where spaces between words and symbols are frequently missing, is very difficult to read. Moreover, a notation at the end of the work could help the reader.
12. Page 9 – line 15: its better the reference to the combination rather than to the single structure.
13. Page 10 – line 3 and page 13 – line 3: what are 4.3.1 and section 4.2?
14. Page 10 – line 4: d_{mi} and d_m are introduced without any definition. They are defined at page 13 (line 1) without specifying if they refer to the input material.
15. Pages 11-12 – Figures 7-8: perhaps a figure where the values in ordinate are reported through points linked by a line for each class (original input sediment,…).
16. Page 14 – Figure 10: what does the mean the plotting of λ_{ik} versus D_k/d_{mi} if any reference to the position of the structure (first, second,…) is missing?
17. Page 14 – Figure 11: both the typology of material and structure combination is missing.
18. Page 20 – Table 5: which is the difference between the sediment code of Table 5 and the grain size sample code of Table 1?

Ikeya H. (1989) Debris flow and its countermeasures in Japan Bull. Int. Ass. of Enginering Geology n 40, 15-33

Johnson P.A. Richard H.M. (1989) Slit dam design for debris flow mitigation Journal of Hydraulic Engineering , ASCE, vol.115, n. 8, 1293-1296

Lien H.P. (2003) Design of slit dams for controlling stony debris flows. International Journal of sediment research, vol. 18, n. 1, 74-87

Watanabe M., Mizuyama T. e Uehara S. (1980) Review of debris flow countermeasures facilities Journal of the Japan Erosion Control Engineering Society, vol. 115, 40-45 (in giapponese)