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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Passive Acoustic Measurement of Bedload Grain Size Distribution using the Self-Generated Noise" *by* Teodor I. Petrut et al.

Anonymous Referee #1

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The manuscript deals with the extraction of the bedload particle mass distribution by monitoring the sound field in a fast flowing river. The manuscript is interesting, however, the matrix methodology used to obtain the distribution requires further explanation. As the text stands it is difficult for the reader to ascertain exactly how the mass distribution is being estimated in terms of physical processes due to the rather unclear meaning of the matrix formulation.

1. P2 Line 3 Parker is cited without a reference.

2. P4 Line 7 'and so integral' should be 'and so the integral'.

3. The authors need to provide more justification as to why they consider the sphere-

slab impact model is an improvement on the sphere–sphere impact model. The slab model uses an image of the impactor as the impactee and hence all collisions are between particles of the same size. The bed is not a slab of material, but a heterogeneous mixture of individual gravel particles of varying differing diameter and hence impacts between particles of differing diameter is highly probable.

4. P6 line 25 'to reduce eliminate' should be 'to reduce'.

5. P7 line 7. Is the term 'dictionary Δ' a technical term, it is not one commonly used in matrix descriptions. What is being referred to by 'dictionary Δ'?

6. A clearer description of the operation of equation 9 is needed, e.g. 'or put in another words' P7 lines 8/9, is not sufficient. This equation is the kernel of the manuscript and needs a high degree of clarity to help the reader understand the manuscript, particularly those who are unfamiliar with the matrix formulation and inversion. Clearly explain the contents of the rows and columns, the matrix operation and how the formulation relates to obtaining the GSD with equation (12). At present the text is loaded with matrix jargon, which makes it difficult for the non-expert in matrix manipulation to follow.

7. P8 line 10 It is unclear what is meant by ''but rather decent idea could be concluded on the model's behaviour', this needs re-phrasing.

8. P8 line 19, 'rest of the parameters are considered of little influence'. It would be helpful to the reader to specify which parameters.

9. P9 line 4 'thanks to' is somewhat colloquial, 'using the' may be more appropriate.

10. P9 The description of equation (12) is quite terse and for reader not familiar with matrix inversion difficult to understand. As with point 6 above, spending a little more time explaining the operation on the matrix formulation and inversion, with a description of the physics which is taking place, would make the analysis much more accessible. Matrix formulations and inversions though relatively common is still a very specialised area and require explanation.

11. P11 Line 26. Again the word ‘thanks’ is used when ‘due to’ would be more appropriate.

12. P12. In section 4.1.2 it is stated that 10-1000 kHz does not represent SGN and 1000-50000 kHz is SGN. Some justification is required for this statement.

13. P12 line 13 ‘almost free of hydrodynamic noise’ and line 15/16 ‘attributed to hydrodynamic noise’ seem slightly contradictory statements about the recorded SGN.

14. P13. ‘D50 by NNLS algorithm is 1-2 mm’, this is not a consistent result with figure 9 (a & b) which have a D50 of 8-18 mm.

15. P14 Line 2 ‘The model Eq. (9) is valid if the acoustic propagation only takes into consideration the sound divergence model.’ It is not clear what the ‘sound divergence model is’, an explanation is required.

16. P15 line 8 ‘overtakes assures enough good SNR of recorded signal’. This is somewhat gobbledegook, what is actually meant.

17. P15 Line 24 the use of the word ‘repartition’ is unclear.

The authors use size, radius and diameter, to describe the dimensions of the spheres, size is ambiguous and should not be used as it could be either diameter or radius.

Before publication, further clarity on the matrix formulation and inversion is required, specifying clearly in physical terms what the columns and rows are in equation (9) and how in practice, i.e. the physical process in equation (13), which generate the GSD. Is it some optimum fit between the measured and computed PSD? It is not exactly clear what physical criterion is used in the matrix inversion to obtain the GSD in figure 9.

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