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Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Effective coastal boundary conditions for tsunami wave run-up over sloping bathymetry" *by* W. Kristina et al.

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Thank you for the review given by Anonymous Referee #3. The comments from Anonymous Referee #3 are answered as follows.

1. The EBC can capture the resonance effect since the interactions between the incoming and reflected waves are included in this technique. We follow the three piece-wise linear profiles of the bathymetry as used in Ezersky et al. (2013), with the slopes that characterize roughly the Indian coast bathymetry (Neetu et al., 2011). A periodic wave with the frequency in the resonant regime is influxed and we get the run-up amplification due to the resonance. The result is presented in Section 5.

2. We have added the reference.

3. We have added both the references.

4. (a) We use the experimental data of Synolakis (1987) for a solitary wave run-up over a canonical bathymetry and show the validation of our technique in Section 5. We have compared the laboratory data with both the coupling of the linear model (LSWE and LVBM) with the NSWE model and the linear model with EBC implementation.

   (b) The EBC formulation for the case when the shoreline is fronted by a vertical wall as presented by Kânoğlu and Synolakis (1998) can be obtained by requiring the normal velocity at the shoreline wall boundary is zero. The present analytical solution is only valid for the run-up case, thus another characteristics for the outgoing or reflected waves must be derived (either for the LSWE or NSWE model).

   (c) The basic idea of the EBC is to couple the linear model (LSWE and LVBM) in the simulation area with the NSWE in the model area. However, an extension of this technique to the case when the NSWE model is used both in the simulation and model area follows directly from the variational methodology. We do not consider the case when nonlinear model is used in both area in this present article.

5. We have removed those type of informations from the main text.

6. We have used larger line width for the plots and put the information in the figure captions when the lines are on top of another.

The revised version of the article can be seen in the supplement.

References

Ezersky, A., Tiguercha, D., and Pelinovsky, E.: Resonance phenomena at the long wave runup on the coast, Nat. Hazard Earth Sys., 13, 2745–2752, 2013.

Kânoğlu, U. and Synolakis, C. E.: Long wave runup on a piecewise linear topographies, J. Fluid Mech., 374, 1–28, 1998.

Neetu, S., Suresh, I., Shankar R., Nagarajan, B., Sharma, R., Shenoi, S. S. C. , Unnikrishnan, A. S., Sundar, D.: Trapped waves of the 27 November 1945 Makran tsunami: observations and numerical modeling, Nat. Hazards, 59, 1609–1618, doi:10.1007/s11069-011-9854-0, 2011.

Synolakis, C. E.: The run-up of solitary waves, J. Fluid Mech., 185, 523–545, 1987.

Please also note the supplement to this comment:
http://www.nonlin-processes-geophys-discuss.net/1/C314/2014/npgd-1-C314-2014-supplement.pdf

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 317, 2014.