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Discussions

Interactive comment on "Nonlinear deformation and run-up of single tsunami waves of positive polarity: numerical simulations and analytical predictions" *by* Ahmed A. Abdalazeez et al.

Anonymous Referee #2

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The topic of this paper is the analysis of the steepening of long single waves of positive polarity (LSWPP) and its effect on the wave run-up. It is studied from analytical and numerical approaches. After a review of the state of art in Section 1 (Introduction) the authors point out the novelty they present since it is the first time that the mentioned effect is addressed. Afterward, in section 2, they present the process they followed to obtain the analytical solution. Section 3 addresses the numerical modeling and comparison with the analytical solution. Section 4 presents the results of the analytical and numerical approaches. Finally, in section 5, the authors give a summary of the study and describe the conclusion they reached.

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Discussion paper

GENERAL COMMENTS

The topic is suitable for the journal since it addresses an issue of interest to the scientific community. The document is written clearly, it is up to the international standards and the length of the paper is adequate. The work is novel since it is the first time that the specific topic of the paper is addressed. However, some parts of the paper may be elaborated in more details and I have a few major concerns that recommend being addressed. These discussion points are outlined in the rest of this review:

1. The presented solution is valid for the applied wave (LSWPP). However, authors go further, linking this type of wave to a tsunami. In the introduction authors highlight that tsunamis have been represented in several ways, being some of them a soliton, like in the case they present. However, Madsen (2008) described how this simplification is not accurate enough to properly represent a tsunami, mainly because solitons do not take into account the tail of the tsunami that is the main component that determines the final run-up. Due to this, the use of tsunami word in the definition of the problem and the direct application of the results of the study to tsunamis must be directly addressed in the paper, explaining the limitations, especially after the paper of Madsen who broke the soliton paradigm for tsunamis. The presented solution could properly solve LSWPP, but its application to tsunamis need further discussion in the paper.

2. I understand from the manuscript that there is a limitation on the result because reflection is not included due to independent analysis: constant depth and plane beach. Does this limitation depend on the geometry (depth, amplitude, Xo) or is it a general limitation? Then in Figure 4 Xo is used and defined as the distance to the toe of the beach, so it is not clear if the real limitation of not taking reflection into account. In the case of a real tsunami, due to its wavelength, depending on the geometry, the reflection would certainly need to be included. Could you discuss this?

3. The presented analysis does not lack scientific rigor, but the generalization of the results is not direct. In order to make it easier the analysis of both graphs and results,

they must be non-dimensionalized. Some references of examples of this standardizations can be found in Madsen and Shaffer (2010), already referred by the authors. This modification allows a better analysis of the results and of the influence of each parameter in the final value of the run-up.

4. The final concern regards the application of the results to real tsunami cases, linked with my first comment. Have the authors tried to use/validate them in any real scenarios? I understand the limitation of the adopted LSWPP over an idealized geometry, but if the intention is to apply the results to tsunami scenarios, some details on the way to do this must be given.

5. Finally, section 5 of the paper is a summary of the work, together with a brief discussion. A summary is always interesting but a specific section of conclusions, clearly stated, for instance in bullets, would give a better overview.

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