Comments on the manuscript entitled
"On the Resonance Hypothesis of Tsunami and Storm Surge Runup"
(Ref. NHESS-2016-334-version3)
by **Nazmi Postacioglu, M. Sinan Özeren & Umut Canlı**

This is a nice, semi-analytical paper that provides a useful analysis of the resonance of long wave runup on beaches. The paper is of obvious interest for the readers of *NHESS* and it is fairly well written. There are, however, some weaknesses that require a moderate revision, also along the lines below proposed, before publication be granted.

Main issues

The seaward boundary conditions Although linearization of the seaward boundary condition is an understandable simplification of the problem, this leads to some underestimation of the wave runup, as demonstrated by Antuono & Brocchini (2007). I am not requesting that nonlinear boundary conditions be used, which would make the analysis less straightforward, rather that the above be explicitly acknowledged.

The model limitations Beyond linearization of the seaward boundary condition, the model is, by force, characterized by a number of shortcoming, which, though understandable, should be properly acknowledged (see "Specific Issues").

The context The Introduction and various descriptions, though clear and fairly well structured, seem to be missing quite a few important contributions. These should be reintroduced and properly described as suggested, for example, in the "Specific Issues".

Specific issues

The following specific issues require attention (line numbers are those provided by the authors' editing):

1. Abstract and Conclusions. The model, though interesting, is characterized by some shortcomings (see in the following), which should be briefly acknowledged here;

2. Introduction, first 3 lines. This list of references could well accommodate the following works, all based on Carrier & Greenspan transformation but giving account of different issues, like the horizontally-2D nature of the flow, the wave groupiness and the actual boundary value nature (not initial value one) of the problem at hand: Brocchini (1998), Brocchini & Gentile (2001) and Antuono & Brocchini (2008);

3. page 3, lines 19-21. Fundamentals for this important result are discussed in Antuono & Brocchini (2007), which should be recalled here;

4. page 4, line 11. η' is a free surface elevation, not a wave height (crest minus through elevation...);

5. page 6, lines 3-5. This is a fairly important matter because the mentioned linearization generally leads to a shoreline dynamics weaker than that it would be obtained from a more accurate data assignment, as demonstrated by Antuono & Brocchini (2007). This should be briefly but clearly acknowledged (here, in the Abstracts and Conclusions);

6. page 8, lines 1-2. The divergence here discussed, though not significantly affecting the solution in the shallow waters, is a mark of some shortcomings in the analysis of the problem. For the sake of clarity, this should be briefly acknowledged in both Abstract and Conclusions;

7. page 9, lines 6-8. This sentence calls for brief discussion of the applicability of the proposed theory to real-life conditions;

8. page 13, lines 9-10. This should be commented in conjunction to the previous point;

9. page 15, lines 1-3. This is another shortcoming of the model that, for the sake of clarity, should be briefly acknowledged in both Abstract and Conclusions;

10. section 4.2. This section, dedicated to the role of nonlinearities, should include a discussion of the improper use of linearized boundary conditions, leading to an incorrect weakening of the shoreline dynamics, as demonstrated by Antuono & Brocchini (2007);

11. page 15, line 6. This sentence, depends on the previous one and cannot stand alone;

12. page 18, line 17. Among the few analytical studies of this problem that actually provide useful insight in the physics at hand are those of Brocchini & Peregrine (1996) and Brocchini (1998), which should be recalled here.

References

- Antuono, M. & Brocchini, M.. (2007). The Boundary Value Problem for the Nonlinear Shallow Water Equations. *Stud. Appl. Maths.* **119(1)**, 73-93;
- Antuono, M. & Brocchini, M. (2008). Maximum run-up, breaking conditions and dynamical forces in the swash zone: a Boundary Value approach. *Coast. Engng.* **55(9)**, 732-740;
- Brocchini, M. (1998). The run-up of weakly-two-dimensional solitary waves *Nonlin. Proc. Geophys.* **5**, 27-38;
- Brocchini, M. & Peregrine, D.H. (1996). Integral flow properties of the swash zone and averaging. *J. Fluid Mech.* **317**, 241-273;
- Brocchini, M. & Gentile, R. (2001). Modelling the run-up of significant wave groups. *Cont. Shelf Res.* **21(15)**, 1533-1550.