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Interactive comment on "Explosive instability due to flow over a rippled bottom" *by* Raunak Raj and Anirban Guha

Anonymous Referee #2

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This manuscript presents a theoretical study of the two-dimensional "explosive instability" of resonant triads between two surface waves and either a bottom ripple or a vorticity wave on a velocity interface. I believe that this might ultimately be publishable in Nonlinear Processes in Geophysics, but not in its present form. The two principle reasons are listed below.

1. I am concerned that the results from section 2 (two-layered fluid) are not sufficiently novel. The explosive instability in a two-layer fluid using piece-wise linear velocity profiles (analogous to the present work) was previously investigated by Voronovich and Rybak (Oceanology 1977) and Voronovich et al. (Isvestia 1980). The work of Alam (JFM 2012) on triad resonance between two surface waves and an interfacial wave (without shear, and hence without the explosive instability) should also be recognized.

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Discussion paper

The results in the present manuscript appear to be very similar to these prior studies. The authors need to revise the manuscript to acknowledge this and discuss the differences between the results, or else remove this section if the results are essentially identical.

2. On page 8, the authors refer to a numerical simulation of the explosive instability for a bottom ripple, but present no results. Instead, an archive pre-print is referenced. I recommend incorporating the numerical simulations into a revised manuscript, as this would make the article much more complete and thorough. Readers would benefit from seeing illustrations of the flow showing how the explosive instability works in practice. As a further suggestion, a numerical simulation of the two-layer case (Sect. 2) would also be a valuable addition, as this could establish the existence of an explosive instability with velocity profiles that are more realistic than the piece-wise linear profiles used here. Such a simulation could be publishable even if the theoretical results are essentially identical to the previous work of Voronovich.

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