Subharmonic resonant excitation of edge waves by breaking surface waves

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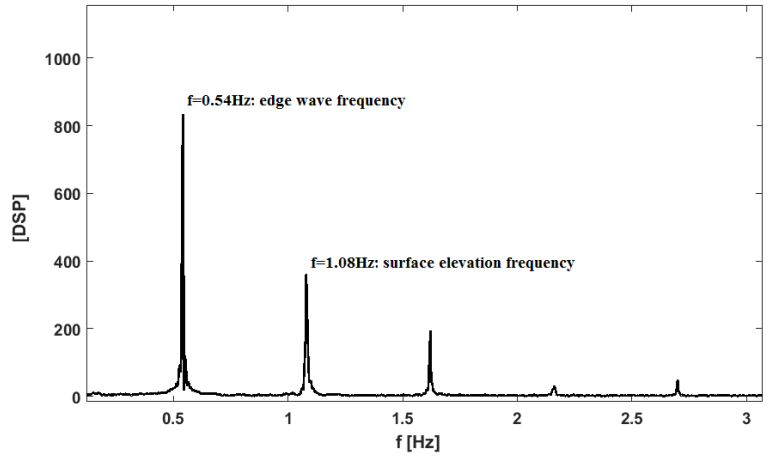
We thank the reviewer for his thoughtful critiques of our manuscript. We have adopted all of his suggestions. Our point-by-point response to the comments and questions is given below.

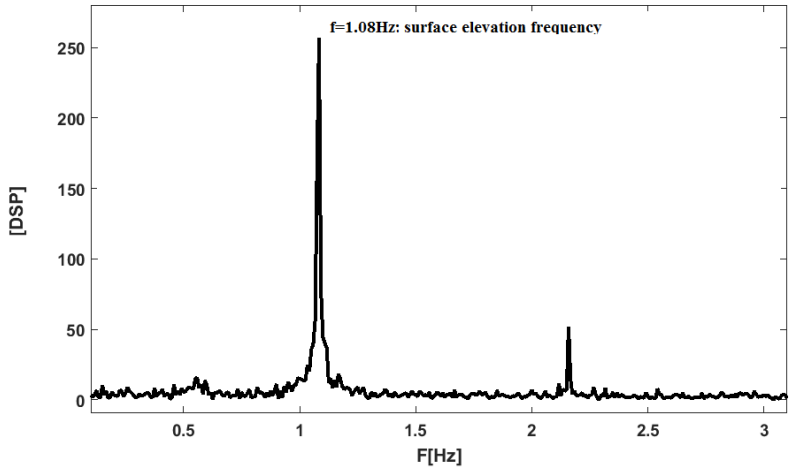
Response to referee N°1

1) It is worth presenting the raw data explicitly displaying the period doubling effect. ADV versus wave gauges? Difference between wave gauge reading?

We have added a new Figure 3, where we show two frequency spectra. The first spectrum (Figure 3 a) is the FFT of the signal shown in Figure 2a. This is a spectrum in absence of breaking waves, where the first peak indicates the edge wave frequency and the second peak indicates the surface elevation frequency. The second frequency spectrum (Figure 3 b) is plotted in presence of breaking wave and indicates the suppression of the peak for the edge wave frequency.



(a)



(b)

Figure 3. Power spectrum frequency: (a) in absence of breaking waves: the first peak indicates the edge wave frequency, while the second peak indicatesthe surface elevation frequency; (b) in presence of breaking waves: the peak for the edge wave frequency is suppressed.

2) The flume is narrow hence parameters of transverse oscillations are somewhat defined by its width. It is worth commenting on the choice of excitation frequency. It could happen that secondary waves may appear due to asymmetry of the wavemaker or some other parameters of the flume. Transverse waves do routinely appear in such flumes all the time and the mechanisms can vary.

Our excitation frequency range was chosen following our published study about the physical simulation of resonant wave run-up on a beach (see: Physical simulation of resonant wave run-up on a beach, *Nonlin. Processes Geophys.*, 20. (2013)). In this study we describe edge waves excited by the 3rd resonant mode of the system.

3) How the influence of reflected waves is accounted for? Duration of the experiment is not that long so talking about rising/receding wave amplitude should be accompanied by discussion of the applicability of the assumption about the incident wave parameters.

The actual duration of the experiment is 240s, but for better graphic representation of the signal we show just first 120s. For the same reason we do not show the signal P1 recorded next to the wavemaker.
We observe oscillations as a sum of incident and reflected waves. However, we use the signal just after the transition time, where the total amplitude is twice larger than the incident wave amplitude.

Well..ideally, incident wave parameters should be measured by an array of wavegauges.

We cannot use probes (such as probe P1 on Figure 1) very close to the shoreline due to the low water depth. This is why we use probes P2 and P3.
P2 and P3 are placed and glued to the inclined bottom slope that allows us to measure wave run-up and run-down.

Response to referee N°2

(i) To have more confidence in claims' authors, it should be more useful to use frequency spectra of the surface elevation, namely to demonstrate quantitatively the period doubling and edge wave suppression.

We have added a new Figure 3, where we show two frequency spectra. The first spectrum (Figure 3 a) is in absence of the breaking waves, where the first peak indicates the edge wave frequency and the second peak indicates the surface elevation frequency. The second frequency spectrum (Figure 3 b) is plotted in presence of breaking wave and indicates the suppression of the peak for the edge wave frequency.

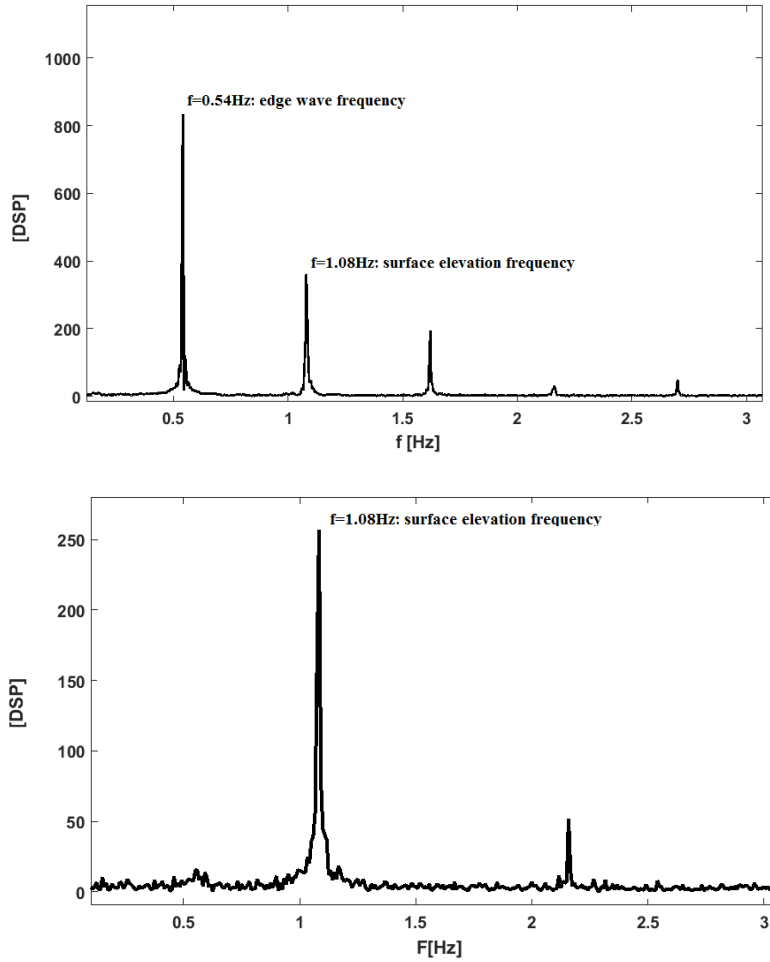


Figure 3. Power spectrum frequency: (a) in absence of breaking waves: the first peak indicates the edge wave frequency, while the second peak indicates the surface elevation frequency; (b) in presence of breaking waves: the peak for the edge wave frequency is suppressed.

(ii) In equation (9) specify b (complex conjugate).*

Added after Eq. (9): "b* is a complex conjugate"

(iii) In figure 1, plot axes z and y.

Done.

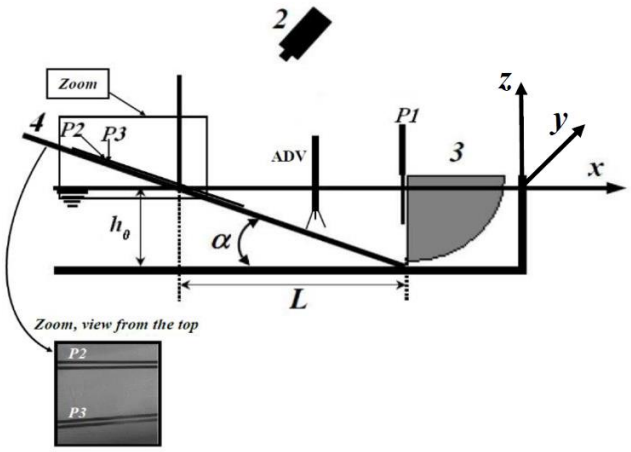


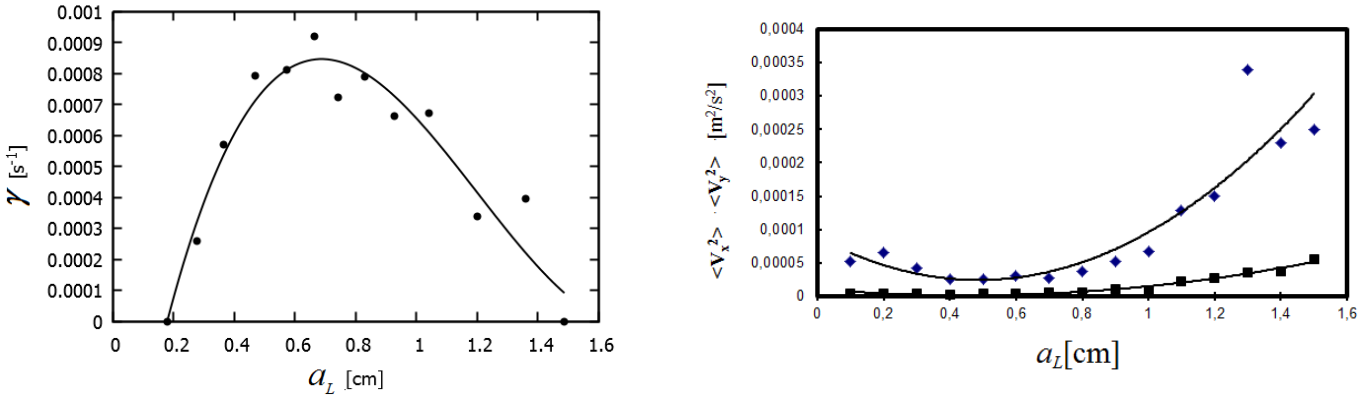
Figure 1. The experimental set-up: resistance probes: vertical (P1) and horizontal (P2, P3), a high-speed video camera (2), a wave maker of a piston type (3), an inclined bottom (4), and ADV.

(iv) What kind of wavemaker is used?

Added on Page 3: "The flume is equipped with a piston type of wave-maker controlled by the computer", see also the caption to Figure 1.

(v) I assume that in figure 5 the solid lines fit the experimental data.

The caption to Figure 5 (now 6) has been changed:



(a) (b)

Figure 6. (a) Dependence of the exponential index of parametric instability γ on the surface wave amplitude a_L, shown by the black dots, and (b) dependence of the kinematic turbulent energy components on the surface wave amplitude a_L; V_x is shown by blue diamonds, while V_y is shown by black squares. Solid lines represent a fit to the experimental data.

(vi) The English must be improved.

The language has been corrected