Review of: **The Fully Nonlinear Stratified Geostrophic Adjustment Problem**

by A. Coutino and M. Stastna

The work presented in this manuscript is a re-examination of the mass adjustment for the classic dam-break problem with nonlinear high-resolution 2D numerical simulations. New results appear to focus on the dispersion characteristics of the radiating wavepacket and on the impact of the initial disturbance polarity. The behavior of the adjusted state for different Rossby number regimes discussed here is definitely not new. The general topic should be of interest to the general readership of the journal. However, the manuscript appears to have been submitted without careful editing (see comments below). I found the presentation of the results at times repetitious and confusing. A strong discussion rather than a mere enumeration of results would strengthen the paper. Revisions are recommended.

Major comments:

1. I am surprised that no mention is made of the available potential energy anywhere in this manuscript. Since it provides the initial energy source for the mass adjustment, its budget should also be considered. The available potential energy is easily calculated, as is the fraction that is converted to kinetic energy and radiated away as waves. Moreover, it would provide a nice metric for normalizing the kinetic energy and would facilitate comparison with others' results.

2. My second comment pertains to the organization of the manuscript, namely the results section. Cases where the Rossby number is varied by varying rotation rates and perturbation widths are first presented. This is then followed by another section titled "Rossby number variation". This seems somewhat repetitious. Why not present the former two as subsections of the Rossby number variation section? It would be much easier to follow the discussion of the adjusted states for the various cases considered if the Rossby numbers were given alongside the corresponding w and rotation rate values. This would facilitate comparison with results from earlier studies.

3. In section 3.3, the most energetic stationary state is associated with $w = w_0$ which corresponds to $Ro = 1/2$. One might argue that values of w that yield a Rossby number of $O(1)$, i.e. $w = \{0.5w_0, w_0\}$ will yield geostrophic states with the most kinetic energy. This was demonstrated in Lelong and Sundermeyer (JPO 2005) in their numerical simulations of nonlinear geostrophic adjustment. This is what Figure 5a shows though the figure is so small that it is hard to discern all the curves, i.e. where is the curve corresponding to $w = 0.25w_0$?. I assume that the KE is given as a fraction of the initial (available potential) energy though I could not find this explictily stated in the text or the figure caption. If this is the case, the fraction of KE in the adjusted state agrees with the results of Lelong and Sundermeyer (see their figure 8). Concerning the energetics of nonlinear geostrophic adjustment, another reference is Boss and Thompson (JPO 1994).

Minor comments:

1. A schematic of the initial condition for the 2 perturbation polarities would be helpful. This would help define the undefined parameters H_1, H_2 and H_0. We can guess what they represent but they nonetheless need to be defined.

2. The units used are not consistent. I would suggest sticking to mks units (i.e. do not give

some parameters in meters and others in centimeters or millimeters, e.g. on line 130 and in other places too). Also, please reconcile ρ_0 as defined on line 106 (dimensional) with its (nondimensiona)l value of 1 given on line 141. Units? There is also a missing factor of ρ_0 in the expression for the initial density expression (line 131).

3. There are numerous typos throughout the manuscript, e.g. "preformed" instead of "performed" on lines 113, 128, 134, 157 and probably elsewhere. There are also several run-on sentences (e.g. between lines 105-110, lines 88-90, lines 171-172, lines 207-209, line 325 etc.) and misspellings (e.g. "leftover" instead of "left over", "hight" instead of "height", spansws).

4. Figures are too small. They should span the width of the text. There are no colorbars on the color contour plots. Captions need to convey more information.