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Ocean Science Discussions



# *Interactive comment on* "Retroflection from slanted coastlines – circumventing the "vorticity paradox"" *by* V. Zharkov and D. Nof

**Anonymous Referee #2**

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Report on "Retroflection from slanted coastlines – circumventing the vorticity paradox" by Zharkov and Nof.

This paper is an interesting attempt to investigate the shedding of rings by currents that retroflect and in particular the effect of the orientation of the coast line on the number of rings formed. The main results are applied to the Agulhas rings. The problem of circumventing the vorticity paradox is tackled in different ways. Most of the paper is about a nonlinear analytical model. This is followed by a numerical solution of the derived equations, which suffers from stability problems that require rather high eddy viscosities. Finally the results are compared with a numerical simulation using a reduced gravity model. The comparison is not as good as the authors claim.



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Discussion Paper

In general the paper is well written with clear descriptions of the physical processes involved, good figures and referencing. The mathematically development suffers from a number of inconsistencies (which may be misprints) but certainly need to be sorted out before the paper can be published in Ocean Science.

Specific comments on the mathematics:

P 7, equations (2) and (3). It would be useful if the equations numbers in NP could be quoted.

P7/8, equations (2) and (4). From these two equations it follows that 2(Q+q) = Q-q and so Q = -3q and therefore F = (Q-q)/Q = 4/3. But should F be less than unity?

P 13, equations (16), (17) and (18a). Differentiating (18a) gives u = (af/2) (R+y) which not the same as (16). Similarly differentiating (18b) on P14 does not lead to (16).

P15, equations (25) and (26). Using (1) in (25) and integrating and then using the boundary condition at r=R does not give (26). In (26) (2-a) is replaced by (-2-a).

P15, equation (28) requires C/h =dR/dt. Probably worth stating here.

P16, equation (29). Should the 24 actually be 12? Note also that H* is not defined in the text, only in the appendix.

P17, equation (33). Not obvious how this comes from (20) and (21).

P18 line 9. The RHS of (36) does not have a maximum. The result only follows if state that a cannot exceed unity. a is ring intensity. Why is it less than unity?

The inconsistencies on pages 13, 15 and 16 do not make one confident that the more complicated algebra following these errors is accurate.

Overall the paper is an interesting and novel contribution that is worthy of publication in Ocean Science but only after the mathematics is sorted out.

Interactive comment on Ocean Sci. Discuss., 5, 1, 2008.