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Ocean Science Discussions

Interactive comment on "The structure of the Persian Gulf outflow subjected to density variations" *by* A. A. Bidokhti and M. Ezam

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We thank the anonymous referee #1 for the comments given about our paper. About the first comment, we assume (an assumption of the solved problem) that PV is conserved along the outflow streamlines (as the outflow is trapped against the southern coastal slope), and the streamlines are parallel to coast (in the direction of our local coordinate assigned as y direction). With the assumption that the flow is adjusted geostrophiclly, the velocity component normal to the coast (in x direction), u, is negligible. Hence, du/dy in vorticity equation is zero and the only parameter dependent on x is the depth of the isopycnal surfaces (h), that generate cross stream pressure gradient normal to the coast, which is balanced against Coriolis force. However, u component of the outflow may not be zero as the referee mentioned and other factors which are not considered in the model may generate it. Within our assumptions, we pose the

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problem simple, only to find some gross features of the outflow. About second comment, the variables of the problem are g', h1 and hR, and R is found from the solution of the problem (equation 11). Also equation (12) gives mass flux at the neck of the flow in which, we have assumed to be an internally adjusted baroclinic flow (Rossby adjustment), as we have mentioned in the paper. Finally, About the third comment, as part of the work considers the structure of the outflow based on the hydrographic data, we should also address processes which may create fine scale layering features that are observed in the outflow structure well into the oman sea (figs. 2a and 7), density ratio profiles (fig. 2b) of the outflow in the Oman sea clearly indicates that the flow is prone to double diffusive convection. We could add figures (e.g. say local dT/dz or dS/dz if the referee agrees) to show that the fine layers exist and are scaled well with the dynamics of double diffusive convection. For coarser layers which are clear in fig. 2a Bidokhti (2005), has argued, using laboratory experiments that they may be due to internal waves shearing modes (Wong et. al. 2001). Although careful filed observations including velocity profiles measurements are needed to substantiate them in the outflow more vigorously. Of course the section at which we apply our model is near the Strait of Hormuz where the outflow is more energetic and double diffusive processes are not probably important as the referee indicates. Hence we suggest that these modifications are done to the manuscript: a) Indicating that u component of the velocity of the outflow in the model (normal to the coast) is negligible. b) Adding a figure to show the fine layering structure in the outflow, well into the sea. c) Suppressing the role of internal waves in generating layering in the outflow and mentioning that this requires further work.

Interactive comment on Ocean Sci. Discuss., 5, 135, 2008.