

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

Anonymous Referee #1

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Drs. Bidokhti and Ezam present a simple, analytic, diagnostic model of the outflow from the Persian Gulf. I addresses a topic, the outflow from the Persian Gulf, which is dynamically interesting and has been studied comparatively little. This reviewer is afraid that the model presented in the paper is fatally flawed.

The model, introduced in Eqns. (2) to (12) is based on potential vorticity (PV) conservation and geostrophy. These two principles contain no information about the x-, cross-shore, structure of the flow, which is assumed to be in the y direction. According to this assumption, "const" in (2) is an unknown function of x, $C(x)$ for short. PV is conserved along streamlines - which run parallel to y. When (4) is inserted into (2), $C(x)$ remains unknown. Even if $C(x)$ can be determined at the edge of the domain, $x=0$, this is not helpful for the problem.

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As written in the paper, the strong and unstated assumption thus is that PV is constant across the stream. It is not justified in the paper. Without such justification the model cannot be valid.

The model is diagnostic, hence only limited information can be gained from it. The paper reflects this condition; we learn little from the model. Without prior knowledge of the variables in the model, g' , R (the width of the outflow), h_1 and h_R , no inference can be made.

The paper mixes analyses from hydrographic observations with the model in ways this reviewer does not find helpful. The reference to double diffusion has nothing to do with the rest of the paper and adds nothing to it. It is unlikely for double diffusion to be important in the rather energetic flow of the Persian Gulf Outflow. The density ratio indicates the possibility of the occurrence of double diffusion, no more than that. "Tongues" of Persian Gulf Water extending laterally from the outflow are attributed to internal waves. This statement is unsubstantiated. There are processes other than internal waves which can produce intrusions. The paper either needs substantiation of this point or its suppression. The matter quite peripheral to its principal theme.

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

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