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## The Self-Propagating Quasi-Monopolar Vortex

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#### **ABSTRACT**

If an azimuthally symmetric barotropic eddy on the f plane is subject to a relatively small amplitude disturbance of unit azimuthal wavenumber (m=1), it can propagate very many diameters away from its origin, as shown by a weak nonlinear theory for a piecewise uniform vorticity eddy, and also for one with continuous vorticity inside a finite area. In the former case an initial value contour dynamical calculation shows that the analytical solution is realizable over long distances; the same is true in the latter case, as shown by spectral calculations using the full two-dimensional vorticity equation (with small dissipation). The oceanographic significance of this effect lies in the ability of *almost* symmetric eddies to self-propagate over large distances and collide with other eddies, currents, and continents; this produces important mixing effects, as illustrated herein. It is also shown how the analysis and the effect is generalizeable to a  $1\frac{1}{2}$ -layer density model on the  $\beta$  plane.

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