Abstract View

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The Behavior of a Barotropic Eddy on a β-Plane

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ABSTRACT

An experimental method for producing an isolated eddy in a laboratory tank is described, along with the simple viscous theory of the behavior of the eddy in an ordinary cylindrical tank without the β-effect. The linear inviscid theory incorporating the β-effect is then developed as an initial value problem, and the solution is found as a summation of normal Rossby wave modes of the basin. This theoretical solution is compared with results from laboratory experiments and with numerical simulations obtained for the "sliced-cylinder" laboratory model. It is found that nonlinear effects lead to a cyclonic circulation in the northern half of the tank and an anticyclonic circulation in the southern half. Two simple models are developed to account for these induced circulations.