

**Skorokhodov, S. L.; Kuzmina, N. P.**

**On the influence of the beta effect on the spectral characteristics of unstable perturbations of ocean currents.** (English. Russian original) [Zbl 1456.76056](#)

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**Summary:** Based on the equation for potential vorticity in the quasi-geostrophic approximation, an analysis of stable and unstable perturbations of ocean currents of a finite transverse scale with a vertical linear velocity profile (Couette-type flows) is presented. The model takes into account the influence of vertical diffusion of buoyancy, friction, and the beta effect (the change in the Coriolis parameter with latitude). The analysis is based on the small perturbation method. The problem depends on several physical parameters and reduces to solving a spectral non-self-adjoint problem for a fourth-order equation with a small parameter at the highest derivative. Asymptotic expansions of eigenfunctions and eigenvalues are constructed for small values of the wavenumber  $k$ . Using the continuation in the parameter  $k$ , trajectories of the eigenvalues are calculated, which made it possible to compare the influence of the beta effect on unstable perturbations of the first and higher order modes. It is shown that the flow instability depends in a complex way on the physical parameters of the flow.

**MSC:**

**76E20** Stability and instability of geophysical and astrophysical flows

**76U60** Geophysical flows

**76M45** Asymptotic methods, singular perturbations applied to problems in fluid mechanics

**86A05** Hydrology, hydrography, oceanography

**Keywords:**

spectral non-self-adjoint problem; parameter continuation method; Newton method; asymptotic expansion

**Full Text:** [DOI](#)

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