

Berloff, P.; Kamenkovich, I.; Pedlosky, J.

A mechanism of formation of multiple zonal jets in the oceans. (English) Zbl 1181.76071
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Summary: Multiple alternating zonal jets observed in the ocean are studied with an idealized quasi-geostrophic model of flow in a zonal channel. The jets are maintained by the eddies generated by the imposed, supercritical background flow. The formation, nonlinear dynamics and equilibration of the jets are explained in terms of linear stability arguments and nonlinear self-interactions of the linear eigenmodes. In the proposed mechanism, energy of the background flow is released to the primary instability mode with long meridional and short zonal length scales. This mode undergoes secondary, transverse instability that sets the meridional scale of the emerging multiple zonal jets. This instability channels energy into several weakly damped zonal eigenmodes that amplify the jets. The emerging jets feed back on the instabilities through the partial meridional localization of the most unstable eigenmodes.

MSC:

76E20 Stability and instability of geophysical and astrophysical flows
76U05 General theory of rotating fluids
86A05 Hydrology, hydrography, oceanography

Cited in **12** Documents

Full Text: [DOI](#)

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