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Symmetric instability in two-layer rotating shallow water model and its nonlinear evolution

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We study symmetric instability in 2-layer rotating shallow water model. We consider a barotropic localized jet on the f-plane and on the equatorial-beta plane, and use the collocation method to obtain the structure of linearly unstable modes. We then simulate the nonlinear evolution of the flow disturbed by thus obtained most unstable mode, with the help of a high-resolution finite-volume numerical scheme. We observe the growth and the nonlinear saturation of the instability. The saturation of the instability for moderate growth rates leads to a slow oscillation of the balanced jets in both layers relative to each other. For larger growth rates the instability develops rapidly leading to the onset of local Kelvin-Helmoltz instabilities.