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Passive scalars chaotic dynamics induced by two vortices in a two-layer geophysical flow with shear and rotation EUGENE RYZHOV, Pacific Oceanological institute — Vortex motion in shear flows is of great interest from the point of view of nonlinear science, and also as an applied problem to predict the evolution of vortices in nature. Considering applications to the ocean and atmosphere, it is well-known that these media are significantly stratified. The simplest way to take stratification into account is to deal with a two-layer flow. In this case, vortices perturb the interface, and consequently, the perturbed interface transits the vortex influences from one layer to another. Our aim is to investigate the dynamics of two point vortices in an unbounded domain where a shear and rotation are imposed as the leading order influence from some generalized perturbation. The two vortices are arranged within the bottom layer, but an emphasis is on the upper-layer fluid particle motion. Point vortices induce singular velocity fields in the layer they belong to, however, in the other layers of a multi-layer flow, they induce regular velocity fields. The main feature is that singular velocity fields prohibit irregular dynamics in the vicinity of the singular points, but regular velocity fields, provided optimal conditions, permit irregular dynamics to extend almost in every point of the corresponding phase space.

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