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Topological Aspects of the Tornado Problem

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We examine the topological aspects of a concentrated vortex structure, a tornado, in inviscid fluid. A laboratory study is complemented by numerical simulations of vortex dynamics taking into account the topological structures of vortex knots. Natural observation performed in Kazakhstan (June 2002) agree reasonably well with laboratory experiments. We explored the Lagrangian method for study of vortex surface evolution based upon the vorton model. The Lyapunov stability conditions is essential while studying the Euler characteristic of the vorticity field. The possibility of effective stirring mixing by steady motion in the vortex core is pointed out. These problems might be benchmark ones for various numerical schemes in the vortex dynamics.

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