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12. Probability and Statistics

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Self-similar viscous rotating vortical structures

We discuss progress in seeking a proof of the existence or non-existence of rotating, self-similar decaying vortical structures. A well-known example is the Gaussian which is composed entirely of zero azimuthal wavenumber components. However, numerical and laboratory experiments suggest the existence of stable multipolar objects though it is not clear whether such observations coincide with self-similar solutions that exist for all time. To seek a proof of the existence or impossibility of these multipolar structures, we examine the evolution of the azimuthal Fourier modes of the vorticity field together with a global nonlinear constraint.