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Comparing nearly singular vorticity moments in Euler and Navier-Stokes numerical solutions ROBERT M. KERR, University of Warwick — The inviscid growth of a range of vorticity moments in Navier-Stokes and Euler calculations are compared for simulations using a new anti-parallel initial condition. One goal is to understand the origins of a new hierarchy of rescaled vorticity moments in several Navier-Stokes calculations where the rescaled moments obey $D_m \geq D_{m+1}$, the reverse of the usual $\Omega_{m+1} \geq \Omega_m$ Hölder ordering. Two temporal phases have been identified for the Euler calculations. In the first phase the $1 < m < \infty$ vorticity moments are ordered as $D_m \geq D_{m+1}$, as in the Navier-Stokes case and grow in a manner that skirts possible singular growth with $D_m^2 \rightarrow \sup|\omega| \sim A_m(T_c - t)^{-1}$ with the A_m are nearly independent of m. In the second phase, the new D_m ordering breaks down and the Ω_m converge towards super-exponential growth for all m, shown by plotting $\log(d\log\Omega_m/dt)$. The transition is identified using new inequalities for the upper bounds for the $-dD_m^{-2}/dt$. The Navier-Stokes solutions while showing less growth in the D_m, surprisingly obey $D_m \geq D_{m+1}$ for all times.

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