Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Strong enstrophy events and maximal growth estimates in turbulence simulations JOERG SCHUMACHER, TU Ilmenau, BRUNO ECKHARDT, Philipps University Marburg, CHARLES R. DOERING, University of Michigan Ann Arbor — The temporal growth of enstrophy is a question of fundamental interest which is intimately related to the open problem of uniqueness and regularity of solutions of the Navier-Stokes equations. Recently, Lu and Doering derived a rigorous upper bound for the temporal growth of enstrophy and detected the optimal structures that can cause such events. Here, we study the temporal growth of large-amplitude vortices locally, in quasi-Lagrangian frames of reference which are moving with a swarm of Lagrangian tracers. The analysis is done in situ with highly-resolved direct numerical simulations of forced homogeneous isotropic turbulence at a Taylor microscale Reynolds number of 107 with N=2048 grid points in each direction. The most rapid growth events in the simulations are found to correspond with interacting Burgers vortices.

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Date submitted: 16 Jul 2007 Electronic form version 1.4