Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Thermalization and Turbulence Bottleneck JIAN-ZHOU ZHU, Theoretical Division, Los Alamos National Laboratory, URIEL FRISCH, WALTER PAULS, Observatoire de la Cote d'Azur, Nice, SUSAN KURIEN, Theoretical Division, Los Alamos National Laboratory — It is conjectured that for many equations of hydrodynamical type, including the three-dimensional Navier-Stokes equations, the Burgers equation and various models of turbulence, the use of hyperviscous dissipation with a high power α (dissipativity) of the Laplacian and suitable rescaling of the hyperviscosity becomes asymptotically equivalent to using a Galerkin truncation with zero dissipation and suppression of all Fourier modes whose wavenumber exceeds a cutoff k_d. The Galerkin-truncated Euler system will develop a thermalized range at high wavenumbers as presented by Cichowlas et al [*Phys. Rev. Lett.* **95** (2005) 264502]. It is therefore proposed to interpret the phenomenon of bottleneck, which becomes stronger with increasing α, as an aborted thermalization. Numerical verification of these ideas are discussed, along with various artefacts which can appear when using hyperviscosity.

Jian-Zhou Zhu
Theoretical Division, Los Alamos National Laboratory

Date submitted: 03 Aug 2007 Electronic form version 1.4