Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Restricting integral length scale growth in triply periodic turbulence simulations LIMBERT PALOMINO, CHANDRU DHANDAPANI, JEFF RAH, GUILLAUME BLANQUART, California Institute of Technology — The 3D periodic box is an essential tool for studying turbulence. It is both an apposite canonical configuration for homogeneous isotropic turbulence and a computationally efficient configuration to simulate. Unfortunately, without an active mean of generating turbulence, the turbulent kinetic energy decays over time due to viscous dissipation. Through the years, various methods of forcing the Navier-Stokes have been proposed to maintain this statistically sta- tionary turbulence, including spectral and linear forcing. Although linear forc- ing schemes fully capture the physics of turbulence, as the simulation evolves in time, the largest eddies in the simulation grow to the order of the computational domain size. The current study characterizes this growth in terms of both the integral length scale and the corresponding energy spectra. Furthermore, we propose a modified linear forcing technique that is analogous to a re-scaling of the computational domain at each time step. This provides more active control over the integral length scale and eddy growth in the simulations.

Joseph Ruan
California Institute of Technology

Date submitted: 02 Aug 2019 Electronic form version 1.4