Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Energy Spectra of Higher Reynolds Number Turbulence by the DNS with up to 12288^3 **Grid Points** TAKASHI ISHIHARA, JST CREST, Nagoya University, YUKIO KANEDA, Aichi Institute of Technology, KOJI MORISHITA, MITSUO YOKOKAWA, Kobe University, ATSUYA UNO, RIKEN AICS
— Large-scale direct numerical simulations (DNS) of forced incompressible turbulence in a periodic box with up to 12288^3 grid points have been performed using K computer. The maximum Taylor-microscale Reynolds number R_λ, and the maximum Reynolds number Re based on the integral length scale are over 2000 and 10^5, respectively. Our previous DNS with R_λ up to 1100 showed that the energy spectrum has a slope steeper than $-5/3$ (the Kolmogorov scaling law) by factor 0.1 at the wavenumber range ($k\eta < 0.03$). Here η is the Kolmogorov length scale. Our present DNS at higher resolutions show that the energy spectra with different Reynolds numbers ($R_\lambda > 1000$) are well normalized not by the integral length-scale but by the Kolmogorov length scale, at the wavenumber range of the steeper slope. This result indicates that the steeper slope is not inherent character in the inertial subrange, and is affected by viscosity.

Takashi Ishihara
JST CREST, Nagoya University

Date submitted: 30 Jul 2014 Electronic form version 1.4