Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Intermittency and universality of small scales of passive scalar in turbulence[1] TOSHIYUKI GOTOH, TAKESHI WATANABE, Nagoya Institute of Technology — Recent experiments and Direct Numerical Simulations (DNSs) suggest that the small scale statistics of passive scalar may not be as "universal" as in the velocity case. To address this problem, we study the moments of scalar increment in steady turbulence at $R_\lambda > 800$ by using DNS up to the grid points of 4096^3. In order for the scalar and turbulent flow to be as faithful as possible to the assumptions that would be made in theories, Scalar 1 and Scalar 2 are simultaneously convected by the identical isotropic turbulent flow but excited by two different methods. Scalar 1 is excited by the random scalar injection which is isotropic, Gaussian and white in time at low wavenumber band, while Scalar 2 is excited by the uniform mean scalar gradient. The moments of two scalars as functions of the separation vector are expanded in terms of the Legendre polynomials to extract the scaling exponents of the moments up to the 4th anisotropic sector for Scalar 2. It is found that the exponents of the isotropic sectors seem to have the same values at separation distances in the narrow range over which the 4/3 law holds simultaneously for two scalars. The exponents of the anisotropic sectors and the cumulants of the moments will also be reported.

[1]HPCI, JHPCN, Grant-in-Aid for Sci. Res. No.24360068, Ministry of Edu. Sci., Japan

Toshiyuki Gotoh
Nagoya Institute of Technology

Date submitted: 15 Jul 2014 Electronic form version 1.4