

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Coherent vorticity extraction in turbulent channel flow using anisotropic wavelets KATSUNORI YOSHIMATSU, TELUO SAKURAI, Nagoya University, KAI SCHNEIDER, M2P2-CNRS and CMI, Aix-Marseille Universite, MARIE FARGE, LMD-IPSL-CNRS Ecole Normale Superieure, KOJI MORISHITA, Kobe University, TAKASHI ISHIHARA, Nagoya University — We examine the role of coherent vorticity in a turbulent channel flow. DNS data computed at friction-velocity based Reynolds number 320 is analyzed. The vorticity is decomposed using three-dimensional anisotropic orthogonal wavelets. Thresholding of the wavelet coefficients allows to extract the coherent vorticity, corresponding to few strong wavelet coefficients. It retains the vortex tubes of the turbulent flow. Turbulent statistics, e.g., energy, enstrophy and energy spectra, are close to those of the total flow. The nonlinear energy budgets are also found to be well preserved. The remaining incoherent part, represented by the large majority of the weak coefficients, corresponds to a structureless, i.e., a noise-like background flow.

Katsunori Yoshimatsu
Nagoya University

Date submitted: 31 Jul 2014

Electronic form version 1.4