Estimation of the Kubo number at the edge and SOL region of KSTAR

W.-j. Lee[1], J.-w. Kim[1], Y.U. Nam[2], and Y.-c. Ghim[1]

[1]*Department of Nuclear and Quantum Engineering, KAIST, Daejeon, Republic of Korea*

[2]*National Fusion Research Institute, Daejeon, Republic of Korea*

The Kubo number is estimated based on the correlation analysis of the density fluctuations measured by the 2D beam emission spectroscopy system in KSTAR. The Kubo number defined as an autocorrelation time of the fluctuating quantities normalized by the eddy turn over time characterizes significance of the nonlinear interactions of the turbulent plasma [1]. If the Kubo number is larger than the unity, the nonlinear interaction is strong, and the turbulence of the plasma is considered to be strong. For the strong turbulence, the quasilinear approximation is invalid since the nonlinear terms cannot be ignored. The Kubo number is estimated in the L-mode, ELMy and ELM-suppressed H-mode plasma at the edge and SOL region of KSTAR. To extract the nonlinear interaction time from the 2D(radial and poloidal) fluctuating density measurements, we assume that the level of density fluctuations follows the Boltzmann response; while the phases between the density and electrostatic potential are not constrained to allow finite turbulence induced transport.

[1] J.A. Krommes, “Fundamental Statistical Descriptions of Plasma Turbulence in Magnetic Fields”, *Physics Reports*, vol. 360, April 2002.