

PEM030-17

Room: 303

Time: May 26 11:56-12:09

Level-crossing method in the analysis of plasma turbulence

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Control of plasma turbulence in magnetic confinement devices represents one of the most important issues in the pursuit of fusion energy production since turbulence enhances transport and degrades confinement of particles and energy. We outline a recently proposed method in studies of edge plasma turbulence in which the amplitude variability is neglected in order to study solely its zero (level)-crossing information [1]. The retained zero-crossing set enables insight into specific aspects of turbulence offering clear distinction between L-mode, dithering H-mode and H-mode in the fusion device; with certain common features revealed between L- mode and the neutral fluid turbulence. Moreover, tendency toward clustering at small scales was found related to intermittency. Above methodology may be of general relevance in analyses of plasma turbulence, as frequently observed in laboratory, space and astrophysical plasmas.

[1] M.R. Rajkovic, T-H, Watanabe and M.M. Skoric, Nucl. Fusion 49 (2009) 095016

Keywords: plasma turbulence, magnetic confinement fusion, intermittency, level-crossing