LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

LLNL-ABS-424546

Analysis of Structures and Event Size Statistics in Plasma Turbulence: Preliminary Results

C.Kamath, Y. Xiao, Z. Lin

February 24, 2010

2010 International Sherwood Fusion Theory Conference
Seattle, WA, United States
April 19, 2010 through April 21, 2010

Analysis of Structures and Event Size Statistics in Plasma Turbulence: Preliminary Results

Chandrika Kamath[1], Yong Xiao[2], and Zhihong Lin[2]

[1]Lawrence Livermore National Laboratory, Livermore, CA 94551, kamath2@llnl.gov
[2]University of California, Irvine, CA 92697

Important insights on turbulent transport can be obtained through analysis of structures and event size statistics. Such analysis is difficult due to the high dimensionality (at least 3D for plasma turbulence: 2D space plus time) of the data, the complexity of the structures, and the requirement that the analysis algorithms be robust enough that they can identify and extract structures that vary considerably over time. In this poster, we present an analysis of events in the ion temperature gradient (ITG) turbulence for the ion heat flux, including statistics on the event sizes and the variation of the integrated ion heat flux as a function of the event size. We use a simple thresholding scheme to identify the events, with the threshold calculated automatically for each time step. Results for both a small and a large device will be presented. The differences between ITG transport (mostly diffusive) [1] and trapped electron mode transport (containing non-diffusive components) [2] will be investigated. Work supported by SciDAC GSEP and SDM centers.

[1] Transport of Energetic Particles by Microturbulence in Magnetized Plasmas, Wenlu Zhang, Zhihong Lin, and Liu Chen, Phys. Rev. Lett. 101, 095001 (2008).

[2] Turbulent transport of trapped electron modes in collisionless plasmas, Yong Xiao and Zhihong Lin, Phys. Rev. Lett. 103, 085004 (2009).