Electromagnetic Effects on Plasma Microturbulence and Transport

P. B. Snyder

General Atomics, P.O. Box 85608, San Diego, California 92186-5608

G. W. Hammett

Princeton Plasma Physics Laboratory, Princeton, New Jersey 08543

Abstract

Results are presented from three dimensional kinetic-fluid simulations of pressure gradient driven microturbulence using a new, numerically efficient model which includes self-consistent magnetic fluctuations and non-adiabatic electron dynamics. A transition from electrostatic ion-drift turbulence to Alfvénic turbulence is seen at modest values of the plasma pressure. Significant electromagnetic effects on heat conductivity are observed, including a dramatic increase as the ideal ballooning threshold is approached, particularly when electron Landau damping is included. Turbulent spectra show a number of similarities to experimental fluctuation measurements.

52.25.Fi, 52.30.Jb, 52.35.Ra, 52.55.Fa