The Catholic University of America  
Department of Physics  
Colloquium

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UMD and IREAP (Institute for Research in Electronics and Applied Physics)

Two-Fluid Simulations of Magnetic Reconnection with kinetic closure

Magnetic reconnection in weakly-collisional plasmas, a process linked to solar flares, coronal mass ejections, and magnetic substorms, has been widely studied through fluid and kinetic simulations. While two-fluid models often reproduce the fast reconnection rate of kinetic simulations, significant differences are observed in the structure of the reconnection regions. Equations of state that accurately account for the development of anisotropic electron pressure due to the electric and magnetic trapping of electrons are included in fluid guide-field simulations of reconnection. This two-fluid system can reproduce details of the reconnection region observed in kinetic simulation. A series of simulations have been conducted revealing a mechanism for regulation of electron pressure anisotropy. Force balance requirements across electron layers allows the derivation of scaling laws for electron heating based on upstream conditions. Predictions are successfully compared to results of fluid and kinetic simulations, as well as spacecraft observations.

Wednesday, February 10th, 2016  
4:00pm  
106 Hannan Hall  
Refreshments will be served at 3:45

Sponsored in part by the Graduate Student Association  
For more information, please contact: Patrick Burke (202) 319-5315

If you would like to request disability accommodations, please contact Patrick Burke at (202)-319-5315 to make arrangements.