

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Applying Asymptotic Approximations to the Full Two-Fluid Plasma System to study Reduced Fluid Models BHUVANA SRINIVASAN, URI SHUMLAK, Aerospace and Energetics Research Program, University of Washington — Simulations are performed using the full two-fluid plasma system. The two-fluid model is investigated for its capabilities of capturing physics that is lost with simpler fluid models such as Magnetohydrodynamics (MHD). Asymptotic approximations are applied to the two-fluid equation system, both individually and collectively, to obtain reduced fluid models. These asymptotic approximations involve ignoring electron inertia, setting the speed of light to infinity and ensuring charge neutrality. Applying all three approximations together gives Hall MHD. The results obtained by applying the asymptotic approximations are compared to the two-fluid plasma model to determine what physics is lost by the application of each approximation. Simulations of electromagnetic plasma shock and collisionless reconnection will be presented to demonstrate the various physical effects.

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Date submitted: 20 Jul 2006

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