

Abstract Submitted  
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**Implicit PIC Studies of MHD Instabilities** D.C. BARNES, W.D. NYSTROM, Coronado Consulting — We are studying the gravitationally driven interchange (g-mode) with implicit PIC. In addition to full implicit PIC, we also use an implicit hybrid approach with electrons described by fluid equations, and full, Lorentz force ion orbits. We have also implemented a delta-f approach (QIP). The models are described in detail and numerical properties considered. Conservation laws are shown to hold for appropriate time centering. We examine the effects of iterating the particles in concert with the moment equations, in contrast with the standard approach of using the moment equations only for the field solve. Implicit systems are solved with Krylov methods (GMRES) with 1 or 2D preconditioning matrices. Preliminary results for the g-mode will be presented.

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