Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Advanced Kinetic Techniques for Global Magnetospheric Simulations H. KARIMABADI, SciberQuest, Inc/UCSD, D. KRAUSS-VARBAN, UCB, H.X. VU, Y.A. OMELCHENKO, SciberQuest, Inc/UCSD — The Solar wind-Earth interaction leads to a complex region of space demarcated by multitudes of coupled boundaries and discontinuities, which mediate the transfer of mass, momentum and energy from the solar wind into the magnetosphere and the ionosphere. *The relative importance of these transfer mechanisms is still under debate.* The collisionless nature of the space plasmas necessitates their kinetic treatment. With much progress in computational techniques and increased computational power over the past several years, global magnetospheric hybrid simulations (electron fluid, kinetic ions) have become possible. Thus, discontinuities, current sheets, and boundary layers that were previously only studied in isolation, can now be investigated in their proper context: in the magnetosphere in its entirety, and within the context of solar wind – magnetosphere interaction. However, care must be taken that the discontinuities such as the bow shock and the magnetopause are properly resolved. Furthermore, it is important that the required explicit resistivity (to enable reconnection) is highly localized and does not affect the thickness of current sheets and other discontinuities, or dissipation at the bow shock. We present an overview of novel techniques we are developing to make global hybrid simulations possible, and report results with particular emphasis on the resolution, numerical accuracy, and effect of resistivity models.

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Date submitted: 06 Jul 2006 Electronic form version 1.4