Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Enabling Global Kinetic Simulations of the Magnetosphere via Petascale Computing H. KARIMABADI, H.X. VU, Y.A. OMELCHENKO, SciberQuest, Inc/UCSD, M. TATINENI, A. MAJUMDAR, UCSD, U.V. CATALYUREK, E. SAULE, OSU — The ultimate goal in magnetospheric physics is to understand how the solar wind transfers its mass, momentum and energy to the magnetosphere. This problem has turned out to be much more complex intellectually than originally thought. MHD simulations have proven useful in predicting eminent features of substorms and other global events. Given the complexity of solar wind-magnetosphere interactions, hybrid (electron fluid, kinetic ion) simulations have recently been emerging in the studies of the global dynamics of the magnetosphere with the goal of accurately predicting the energetic particle transport and structure of plasma boundaries. We take advantage of our recent innovations in hybrid simulations and the power of massively parallel computers to make breakthrough 3D global kinetic simulations of the magnetosphere. The preliminary results reveal many major differences with global MHD simulations. For example, the hybrid simulations predict the formation of the quadruple structure associated with reconnection events, ion/ion kink instability in the tail, turbulence in the magnetosheath, and formation of the ion foreshock region.

Yuri Omelchenko
SciberQuest, Inc/UCSD

Date submitted: 09 Jul 2009 Electronic form version 1.4