

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Hybrid simulations of collisionless shocks in exponential density gradients¹ DAVID LARSON, DENNIS HEWETT, LLNL, STEPHEN BRECHT, Bay Area Research Corporation — We present simulations of a strong 3-D collisionless shock transitioning into sub-Alfvénic waves. The transition occurs due changes in the background plasma parameters. The Alfvén speed eventually exceeds the shock speed as the background plasma density falls with altitude; the shock does not run out of energy. At this velocity transition, the shock disassembles into two types of waves: the usual compressional Alfvén wave and a left-hand polarized electromagnetic shear Alfvén wave. This later wave shows remarkable 3-D coherence. Analysis suggests that there are two possible sources of energy: (1) coupling to the strong electromagnetic waves that exist within the collisionless shock and (2) the density and magnetic field gradients at the interface. Results from recent simulations using our three dimensional parallel hybrid plasma code will be presented and discussed.

¹This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

David Larson
LLNL

Date submitted: 17 Jul 2009

Electronic form version 1.4