Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Coupling of fluid-scale and kinetic-scale processes in momentum transport in space and laboratory devices GIOVANNI LAPENTA, LANL — Two sets of experiments and observations suggest that an important factor in the coupling of microinstabilities with large scale processes is momentum transport. In astrophysical systems, there is mounting evidence that microinstabilites can lead to large-scale plasma flows. In the Earths magnetotail, satellite observations have shown microinstabilites driven by pressure gradients at the edge of plasma sheet [1]. We have predicted that such instabilities can lead to momentum transport that penetrates into the current layer and lead to velocity shears on macroscopic scales [2]. In laboratory experiments, for example on Alcator C-Mod, researchers have shown that toroidal angular momentum is generated spontaneously in the plasma edge and propagates inward [3]. The analogy with the space observations is striking as in both cases the microinstabilities develop in the edge of the plasma but momentum propagates inward and angular momentum is generated in the toroidal direction (dawn-dusk direction). Also, at least some of the theories [4] assume that the microinstabilites are due to pressure gradients in both cases. We report our approach to study the problem: a full kinetic implicit simulation code CELESTE [5]. [1] I. Shinohara et al., J. Geophys. Res., 103, 20,365, 1998 [2] G. Lapenta, et al., Phys. Plasmas, 10, 1577, 2003. [3] J.E. Rice et al., Phys. Plasmas, 11, 2427, 2004. [4] B. Coppi, Nuclear Fusion, 42, 1, 2002. [5] G. Lapenta et al., Phys. Plasmas, 13, 055904,2006

Giovanni Lapenta

Date submitted: 31 Jul 2006 Electronic form version 1.4