Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Fourth order discretization of anisotropic heat conduction operator[1] NATALIA KRASHENINNIKOVA, LUIS CHACON, LANL — In magnetized plasmas, heat conduction plays an important role in such processes as energy confinement, turbulence, and a number of instabilities. As a consequence of the presence of a magnetic field, heat transport is strongly anisotropic, with energy flowing preferentially along the magnetic field direction. This in turn results in parallel and perpendicular heat conduction coefficients being separated by orders of magnitude. The computational difficulties in treating such heat conduction anisotropies are significant, as perpendicular dynamics numerically is polluted by the parallel one. In this work, we report on progress of the implementation of a fourth order, conservative finite volume discretization scheme for the anisotropic heat conduction operator into the extended MHD code PIXIE3D [1]. We will demonstrate its spatial discretization accuracy and its effectiveness with two physical applications of interest, both of which feature a strong sensitivity to the heat conduction anisotropy: the thermal instability and the neoclassical tearing mode. [1] L. Chacon Phys. Plasmas 15, 056103 (2008)

[1]Research supported by US Dept. of Energy.

Natalia Krasheninnikova
LANL

Date submitted: 21 Jul 2008 Electronic form version 1.4