Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Trapped Particle Instabilities in the Kinetically Stabilized Tandem Mirror[1] J. PRATT, H.L. BERK, W. HORTON, UT Austin, IFS — The kinetically stabilized tandem mirror (KSTM) is an innovative design to stabilize MHD modes in an axially symmetric tandem mirror machine (Post, J. Fus. Energy 2007). Originally proposed by Ryutov (Ryutov, Proc. of Course and Workshop, Varenna, Italy, 1987), this stabilizer has been empirically verified in the Gas Dynamic Trap (Ivanov, Anakeev et.al. Trans. Fusion Technology. 39, 127, 2001). The KSTM uses the momentum flux of escaping particles that sample good magnetic-field-line-curvature region outside the central confinement region. Charged ion beams at relatively low energy are externally injected from the ends into the expander region at an energy that is consistent with a stable MHD prediction and acceptable power loss for fusion. If stable, the KSTM would be extremely useful for limiting radial diffusion since the chaotic step size is minimized. We confirm that MHD stability is achieved in the KSTM. We examine the effect of the trapped particle instability discussed in Berk, Rosenbluth, et al. Sov. J. Plasma Phys. 1983 on overall stability. In this case stability is very sensitive to the electron connection between the stabilizer and the end plug.

[1]Work supported by DOE Grant No. DE-FG02-04ER54742

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Date submitted: 08 Jan 2009 Electronic form version 1.4