Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Azimuthal Clumping Instabilities in a Z-pinch Wire Array

W. TANG, T.S. STRICKLER, Y.Y. LAU, R.M. GILGENBACH, J. ZIER, M. GOMEZ, University of Michigan, C. GARASI, EDMUND YU, M.E. CUNEO, T.A. MEHLHORN, Sandia National Laboratories — Recent simulations of a high wire-number array Z-pinch reveal a strong azimuthal clumping instability [1]. This instability is found to be entirely analogous to the Jeans instability in a self-gravitating disk, where the mutual attraction of gravity is replaced by the mutual attraction of neighboring wires that carry currents in the same direction. The unstable modes are heavily crowded. We have studied the temporal evolution of initial perturbations which are randomly and uniformly distributed among all modes, i.e., the spectral equivalent of white noise. An analytic scaling law is derived, which shows that randomly seeded perturbations evolve at the rate of the fastest unstable mode, almost from the start. Extension to a coronal plasma, and the coupling of this clumping instability to the magnetic Rayleigh-Taylor instability, will be reported. [1] T. Strickler *et al.*, Phys. Plasmas **12**, 052701 (2005). * This work was supported by U. S. DoE through Sandia National Laboratories award number 240985 to the University of Michigan. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

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Date submitted: 25 Jul 2005 Electronic form version 1.4