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Azimuthal Clumping Instability in Wire Array Z-pinches[1] T. STRICKLER, W. TANG, Y.Y. LAU, R.M. GILGENBACH, M.R. GOMEZ, J. ZIER, Nuclear Engineering and Radiological Sciences Dept., University of Michigan, Ann Arbor, MI, E. YU, C. GARASI, T.A. MEHLHORN, M.E. CUNEO, M.G. MAZARAKIS, Sandia National Laboratories, Albuquerque, NM, D.A. CHALENSKI, J.D. DOUGLASS, J.B. GREENLY, D.A. HAMMER, B.R. KUSSE, Laboratory of Plasma Studies, Cornell University, Ithaca, NY — UM and Sandia have analyzed an azimuthal clumping instability that bunches discrete wires in z-pinches. Highest instability growth rate is pi-mode: wires clumped in pairs. An efficient discrete wire code agrees with analytic theory, showing bunching in sub-100 ns, close to MA z-pinch risetimes. Using Sandia ALEGRA code, wire arrays are simulated utilizing a wedge-shaped sector with reflective boundary conditions. By choosing the wedge sector angle, pi-mode growth of the clumping instability is studied for a given wire number by simulating only a single wire within that wedge. A non-linear analytic theory shows excellent agreement with both ALEGRA and discrete wire codes for high (∼600) and low (8) wire-number arrays. Results are presented of azimuthal clumping experiments on Cornell COBRA.

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