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Simulations of high current wire array Z-pinches using a parallel 3D resistive MHD J.P. CHITTENDEN, Imperial College, C.A. JENNINGS, Sandia National Laboratory, A. CIARDI, Observatoire de Paris — We present calculations of the implosion and stagnation phases of wire array Z-pinches at Sandia National Laboratory which model the full 3D plasma volume. Modelling the full volume in 3D is found to be necessary in order to accommodate all possible mechanisms for broadening the width of the imploding plasma and for modelling all modes of instability in the stagnated pinch. The width of the imploding plasma is shown to arise from the evolution of the uncorrelated modulations present on each wire in the array early in time into a globally correlated 3D instability structure. The 3D nature of the collision of two nested arrays is highlighted and the implications for radiation pulse shaping are discussed. The addition of a simple circuit model to model the Z generator allows the pinch energetics during stagnation to be treated more accurately and provides another point of comparison to experimental data. The implications of these results for improved X-ray production are discussed both for the keV range and for soft X-ray radiation sources used in inertial confinement fusion research. This work was partially supported by the U.S. Department of Energy through cooperative agreement DE-FC03-02NA00057.

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