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Large scale parallel computing simulations of wire array Z-pinches JEREMY CHITTENDEN, NICOLAS NIASSE, Imperial College, ANDREA CIA-RDI, Paris Observatoire — Until recently simulations of wire array Z-pinches have been undertaken in a piece-wise fashion, modelling either only part of the array volume, or modelling different aspects of the array behaviour separately. Recent simulations of a single wire in the array suggest that the short wavelength modulations of the ablating plasma observed in experiments are the result of a modified m=0 like instability. In order to simulate the growth of magneto-Rayleigh-Taylor instabilities during the implosion phase, a separate calculation is usually performed in which estimates for the structure of the modulated ablation are used to provide the initial seed perturbation for the implosion. Improvements to the parallel computing architecture of the Gorgon 3D resistive MHD code, however, mean that is now possible to run with large enough computational grids to encompass the entire volume of the array whilst retaining sufficient resolution to model the spontaneous development of the modulated ablation structure from microscopic noise. Thus we can model the evolution of the wire array from the point of initial plasma formation, right through the implosion, without imposing any predetermined perturbation or structure. A detailed comparison of synthetic diagnostic images with data from MAGPIE experiments is used to test this method. Preliminary data from similar simulations of Z experiments are also presented.

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