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Origin of the interaction pulse in Nested Wire Array Z-pinches[1]

D.J. AMPLEFORD, C.A. JENNINGS, M.E. CUNEO, M.C. JONES, D.B. SINARS, Sandia National Labs, S.N. BLAND, G.N. HALL, S.V. LEBEDEV, J.P. CHITTENDEN, F. SUZUKI-VIDAL, Imperial College London, S.C. BOTT, University of California, San Diego — The interaction pulse emitted by nested wire array z-pinches on the Z-generator is critical to achieving the required x-ray pulse shape for z-pinch driven ICF schemes. We discuss data from the MAGPIE generator which indicates this interaction pulse is likely to be caused by the presence of the inner array creating bow shocks in the ablation streams from the outer array, and hence enhancing the prefill density at this location. As the outer array implodes, it snowplows the prefilled material, radiating excess kinetic energy as snowplow radiation. The enhanced density due to shocked prefill around the inner wires boosts the snowplow, and is seen as the interaction radiation pulse. This understanding agrees with data from Z, which indicates that the interaction pulse is independent of the inner array parameters, and decreases with increasing outer array mass. Comparisons of this model to recent data on the refurbished Z generator will also be discussed.

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