IMPACT OF RAYLEIGH TAYLOR ON NEUTRON PRODUCTION IN A DEUTERIUM Z-PINCH *

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A deuterium gas puff z-pinch has been shown to be a significant source of neutrons with yield scaling with current as $Y_n \sim I^{3.5}$. [1,2] Recent implicit, electromagnetic and kinetic particle-in-cell simulations with the LSP code have shown that the yield has significant thermonuclear and beam-target components.[3] Beam-target neutron yield is produced from deuterium ion high-energy tails driven by the Rayleigh Taylor instability. In this paper, we present further results from 1-3D simulations of deuterium z-pinches over a wider current range 1.4-20 MA. Preliminary results show that unlike the high current regime above 7 MA, the yield at lower currents is dominated by beam-target fusion reactions from high energy ions consistent with experiment.[4] We will also examine in 3D the impact of the Rayleigh Taylor instability on the ion energy distribution. We discuss the implications of these simulations for neutron yield at still higher currents.

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