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Transition from Beam-Target to Thermonuclear Fusion in High-Current Deuterium Z-Pinch Simulations[1] DUSTIN OFFERMANN, DALE WELCH, DAVE ROSE, CARSTEN THOMA, ROBERT CLARK, CHRIS MOSTROM, Voss Scientific, LLC, ANDREA SCHMIDT, ANTHONY LINK, Lawrence Livermore National Laboratory — Fusion yields from dense, Z-pinch plasmas are known to scale with the drive current, which is favorable for many potential applications. Decades of experimental studies, however, show an unexplained drop in yield for currents above a few mega-ampere (MA). In this work, simulations of DD Z-Pinch plasmas have been performed in 1D and 2D for a constant pinch time and initial radius using the code LSP, and observations of a shift in scaling are presented. The results show that yields below 3 MA are enhanced relative to pure thermonuclear scaling by beamlike particles accelerated in the Rayleigh-Taylor induced electric fields, while yields above 3 MA are reduced because of energy lost by the instability and the inability of the beamlike ions to enter the pinch region.

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