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Impact of Low-Mode Areal-Density Asymmetry on the Loss of Confinement for Igniting Capsules[1] K. M. WOO, R. BETTI, Laboratory for Laser Energetics, U. of Rochester — To approach ignition in inertial confinement fusion implosions, large shell areal densities are required to confine the high-temperature fusion plasma during the disassembly phase. The presence of low modes in implosions leads to significant variations in the mass distribution of the cold shell. In this work, an analytic 3-D model for low modes is presented to describe the impact of low modes on the ignition threshold. A new form of the average areal densities is derived in terms of the harmonic mean to capture the hydrodynamics of a fast-disassembly, thin-shell wall. The characteristic time scale defined by the second time derivative of the hot-spot volume at the time of minimum volume is shown to be a good candidate to represent the disassembly time scale. The presence of low-mode areal density asymmetry is shown to quench ignition by driving a higher rate of PdV loss during the disassembly phase than the rate of alpha heating. An analytic relation between neutron yields and stagnation parameters including the areal density is derived.

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