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Integrated 1D PIC Simulation of Fast Ignition[1] BRIAN CHRISMAN, YASUHIKO SENTOKU, A. KEMP, T. COWAN, University of Nevada, Reno — The cone guiding Fast Ignition (FI) concept was demonstrated and the compressed core with 50-100 g/cm^3 was heated up to $\sim$1 keV [Kodama, Nature, 2002]. To understand the core heating physics, we have performed one-dimensional collisional particle-in-cell simulations (PICLS1d). These simulate hot electron/fast ion generation in the laser-plasma interactions, fast particle transport through coronal plasma, and energy deposition in the core. In extremely dense plasma, we found that the plasma wave is damped by collisions, and that the hot electrons couple to the core plasma through collisional processes. Heating efficiency highly depends upon characteristics of hot electrons. Fast ions are also generated from the front surface of the cone tip, which contribute to the energy of the core. We have simulated the effect of differing laser pulse conditions on these core heating mechanisms while maintaining a constant total pulse energy. Simulation results will be discussed including optimal laser parameters for the most efficient heating and levels of degradation for sub-optimal configurations.

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