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The role of mix in inhibiting ignition in inertial confinement fusion schemes driven by either X-ray ablation or magnetized liners J. CHITTENDEN, B. APPELBE, N. NIASSE, J. PECOVER, S. TAYLOR, Imperial College — We report on investigations into how mix can prevent the ignition of hotspot fuel in ICF schemes. In the mainstream approach using X-ray driven ablation, surface defects can be amplified by the Rayleigh-Taylor instability during ablation leading to feed-through of the ablator material which contaminates the hotspot material leading to radiative losses. Even without this feed through, asymmetries arising at the interface between the hotspot and the cold dense fuel layer are amplified by the Rayleigh-Taylor instability during the deceleration phase, leading to mixing of the dense cold fuel layer into the hotspot. This pulls material with low specific enthalpy into the hotpot, lowering the average hotspot temperature and quenching the burn. An alternative approach to achieving ignition is the Magnetized Liner Inertial Fusion scheme, where the fuel is rapidly compressed within a metallic liner using the magnetic pressure generated by a current of several mega-amps. Here the growth of the magneto-Rayleigh-Taylor instability can generate asymmetries in the target which promote the mix of the metallic liner with the fuel or mix of the cold dense regions of fuel with the central hotspot. In this talk we make use of large scale 3D radiation hydrodynamics and MHD models of X-ray driven and liner driven fusion schemes to highlight the roles played by mix in each case. We show that thermal conduction sets characteristic spatial scales, below which mix of the cold fuel with the hotspot becomes increasingly important.

J. Chittenden
Imperial College

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