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Benefits of Moderate-Z Ablators for Direct-Drive Inertial Confinement Fusion M. LAFON, R. BETTI, Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester, K.S. ANDERSON, T.J.B. COLLINS, S. SKUPSKY, P.W. MCKENTY, Laboratory for Laser Energetics, U. of Rochester — Control of hydrodynamic instabilities and DT-fuel preheating by hot electrons produced by laser–plasma interaction is crucial in inertial confinement fusion. Moderate-Z ablators have been shown to reduce the laser imprinting on target and suppress the generation of hot electrons from the two-plasmon–decay instability. These results have motivated the use of ablators of higher-Z than pure plastic in direct-drive–ignition target designs for the National Ignition Facility (NIF). Two-dimensional radiation–hydrodynamic simulations assess the robustness of these ignition designs to laser imprint and capsule nonuniformities. The complex behavior of the hydrodynamic stability of mid-Z ablators is investigated through single and multimode simulations. A polar-drive configuration is developed within the NIF Laser System specifications for each ablator material. The use of multilayer ablators is also investigated to enhance the hydrodynamic stability. Results indicate that ignition target designs using mid-Z ablators exhibit good hydrodynamic properties, leading to high target gain for direct-drive implosions on the NIF. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and the Office of Fusion Energy Sciences Number DE-FG02-04ER54786.

P.W. McKenty
Laboratory for Laser Energetics, U. of Rochester

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