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The Physics of Long- and Intermediate-Wavelength Asymmetries of the Hot Spot A. BOSE, Laboratory for Laser Energetics, U. of Rochester, and U. of Michigan, R. BETTI, Laboratory for Laser Energetics, U. of Rochester, D. SHVARTS, U. of Michigan and Nuclear Research Center, Negev, Israel — The effect of asymmetries on the inertial confinement fusion implosion yield and stagnation pressure will be presented. The asymmetries are divided into low ($\ell < 6$) and intermediate ($6 < \ell < 40$) modes by comparing the wavelength with the hot-spot radius. Long-wavelength modes introduce substantial nonradial motion, whereas intermediate-wavelength modes involve more cooling by thermal losses. It is found that for distorted hot spots, the measured neutron-averaged properties can be very different from the real hydrodynamic conditions. This is because mass ablation driven by thermal conduction introduces flows in the Rayleigh–Taylor bubbles that results in pressure variations, in addition to temperature variations between the bubbles and the neutron-producing region. The yield degradation—with respect to the symmetric case—results primarily from a reduction in the hot-spot pressure for low modes and from a reduction in burn volume for intermediate modes. A general expression is found relating the pressure degradation to the residual shell energy and the flow within the hot spot (i.e., the total residual energy). This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and by the LLNL under subcontract B614207.

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