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Nonlinear generation of ion-acoustic harmonics by stimulated Brillouin scattering DUSTIN FROULA, L. DIVOL, LLNL, C. ROUSSEAUX, CEA-DEF, S. ROSS, UC Davis, N. MEEZAN, D. PRICE, S. DIXIT, S. GLENZER, LLNL, LLNL COLLABORATION, CEA-DEF COLLABORATION — Thomson-scattering experiments in well-characterized laser-produced plasmas have directly observed the primary ion acoustic wave driven by stimulated Brillouin scattering (SBS) together with its harmonics. This work introduced a novel technique to first characterize the dispersion of thermal ion-acoustic fluctuations by applying Thomson-scattering at multiple probe wavelengths. This technique has provided accurate data on both the local electron density and temperature with high temporal and spatial resolution under which we have studied the generation of harmonics. The amplitudes of the second and third harmonics at wave-numbers $4k_o$, and $6k_o$ indicate strong saturation of the primary ion-acoustic wave that itself is driven at $2k_o$. The accurate knowledge of the plasma conditions further allows comparisons with modeling of the fluid nonlinear processes that lead to the generation of harmonics. These processes limit the SBS reflectivity in underdense inertial confinement fusion plasmas and are important for the simulation of laser-plasma interactions in ignition targets for the National Ignition Facility. This work was performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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