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Thomson-Scattering Measurements of Ion-Acoustic Wave Amplitudes Driven by the Two-Plasmon-Decay Instability R.K. FOLLETT, D.T. MICHEL, J.F. MYATT, S.X. HU, B. YAAKOBI, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester — Thomson scattering was used to measure enhanced ion-acoustic waves (IAW's) driven by the two-plasmon-decay (TPD) instability. The IAW amplitude scales with the $3/2\omega$ emission (a TPD signature). Up to 20 beams with 860-μm-diam laser spots generated by 2-ns-long pulses of 3ω (0.351-μm) light with overlapped intensities up to 4×10^{14} W/cm^2 were used to produce $\sim$300-μm density-scale lengths. The IAW amplitudes were measured using 4ω Thomson scattering near 3ω quarter-critical densities. Time-resolved $3/2\omega$ spectroscopy was used to compare the amplitude of $3/2\omega$ emission to the IAW amplitude. $QZAK$[1,2] modeling shows a similar onset threshold and wave amplitude as the experiments. The model suggests that the source of the IAW growth is from the beating of electron-plasma waves, which drive density perturbations through the ponderomotive force. This conclusion is supported by the experimental geometry. This process is shown to be a saturation mechanism for TPD from simulations.[3]
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