Abstract Submitted
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Three-Dimensional Single-Mode Nonlinear Ablative Rayleigh–Taylor Instability R. YAN, R. BETTI, Laboratory for Laser Energetics, U. of Rochester, J. SANZ, E.T.S.I. Aeronáuticos, Universidad Politécnica de Madrid, B. LIU, A. FRANK, Dept. of Physics and Astronomy, U. of Rochester — The nonlinear evolution of the ablative Rayleigh–Taylor (ART) instability is studied in three dimensions for conditions relevant to inertial confinement fusion targets. The simulations are performed using our newly developed code *ART3D* and an astrophysical code *AstroBEAR*. The laser ablation can suppress the growth of the short-wavelength modes in the linear phase but may enhance their growth in the nonlinear phase because of the vortex–acceleration mechanism.[1] As the mode wavelength approaches the cutoff of the linear spectrum (short-wavelength modes), it is found that the bubble velocity grows faster than predicted in the classical 3-D theory. When compared to 2-D results, 3-D short-wavelength bubbles grow faster and do not reach saturation. The unbounded 3-D bubble acceleration is driven by the unbounded accumulation of vorticity inside the bubble. The vorticity is transferred by mass ablation from the Rayleigh–Taylor spikes into the ablated plasma filling the bubble volume. A density plateau is observed inside a nonlinear ART bubble and the plateau density is higher for shorter-wavelength modes. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

[1]R. Betti and J. Sanz, Phys. Rev. Lett. **97**, 205002 (2006).

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