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Highly symmetric interfacial structures in Rayleigh Taylor instability with time-dependent acceleration[1] AKLANT K. BHOWMICK, SNEZHANA ABARZHI, Carnegie Mellon University — Rayleigh Taylor instability in a power-law time dependent acceleration field is investigated for a flow with the symmetry group p6mm (hexagonal) in the plane normal to acceleration. The Regular asymptotic solutions form a one-parameter family and the physically significant solution is identified with the one having the fastest growth and being stable (bubble tip velocity). Two distinct regimes are identified dependent on the acceleration exponent, the RM-type regime, where the dynamics is identical to conventional RM instability and is dominated by initial conditions, and the RT-type regime where the dynamics is dominated by the acceleration term. For the latter, the time dependence has profound effects on the dynamics. In the RT non-linear regime, the time dependence has no consequence on the morphology of the bubbles but the growth rate (bubble tip velocity) evolves as power law with the exponent set by the acceleration. The solutions for a one-parameter family, and are convergent with exponential decay of Fourier amplitudes close to the physical solution. The solutions are stable at maximum tip velocity and flat bubbles are unstable, and the growth/decay of perturbations is no longer purely exponential and depends on the acceleration exponent.

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