Abstract Submitted
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Rayleigh-Taylor mixing with time-dependent acceleration[1]
SNEZHANA ABARZHI, Carnegie Mellon University — We extend the momentum model to describe Rayleigh-Taylor (RT) mixing driven by a time-dependent acceleration. The acceleration is a power-law function of time, similarly to astrophysical and plasma fusion applications. In RT flow the dynamics of a fluid parcel is driven by a balance per unit mass of the rates of momentum gain and loss. We find analytical solutions in the cases of balanced and imbalanced gains and losses, and identify their dependence on the acceleration exponent. The existence is shown of two typical regimes of self-similar RT mixing acceleration-driven Rayleigh-Taylor-type and dissipation-driven Richtymer-Meshkov-type with the latter being in general non-universal. Possible scenarios are proposed for transitions from the balanced dynamics to the imbalanced self-similar dynamics. Scaling and correlations properties of RT mixing are studied on the basis of dimensional analysis. Departures are outlined of RT dynamics with time-dependent acceleration from canonical cases of homogeneous turbulence as well as blast waves with first and second kind self-similarity.

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