Three-Dimensional Morphology of Vortex Interfaces Driven by Rayleigh-Taylor or Richtmyer-Meshkov Instability

N.A. Inogamov[1], M. Tricottet[2], A.M. Oparin[3], and S. Bouquet[2,4]

[1]*Landau Institute for Theoretical Physics, RAS, 142432, Chernogolovka, Moscow region, Russian Federation*

[2]*CEA/DIF, D´epartement de Physique Th´eorique et Appliqu´ee, BP 12, 91680 Bruy`eres-le-Chˆatel, France and*

[3]*Institute of Computer-Aided Design, RAS, 123056, Moscow, Russian Federation*

[4]*CEA/Saclay, Orme-des-Merisiers, DSM/DRECAM/SPEC, 91191 Gif-sur-Yvette Cedex, France*

We study the 3D topology of Rayleigh-Taylor (RT) and Richtmyer-Meshkov (RM) single-modes, which includes bubbles, jets and saddle points. For the first time, we present an analytic description of the interface as a whole, for arbitrary time-dependent acceleration g(t). In the simplest cases we have g(t) = const (the RT case) or g propto delta(t) (the RM case). Previous studies deal with bubbles mainly or are restricted to 2D cases. The dependance of morphology on the lattice - hexagonal, square or triangular – of bubbles are investigated. In the case of a large density ratio, the triangular packing of bubbles produces jets well separated from each other while, in the hexagonal case, jets are connected by liquid sheets. Finally, we compare our analytic results to numerical simulations.