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Numerical and experimental analyses of the translation of bubbles due to non-spherical interface deformations ELENA IGUALADA-VILLODRE, Universidad Carlos III de Madrid, DANIEL FUSTER, Institut Jean Le Rond D'Alembert, Universite Pierre et Marie Curie, JAVIER RODRÍGUEZ-RODRÍGUEZ, Universidad Carlos III de Madrid, HUGO DUTILLEUL, Institut Jean Le Rond D'Alembert, Universite Pierre et Marie Curie — Bubbles developing strong interface deformations (e.g. jetting) experience a strong net force that influences significantly their translational motion. In this work, the translation of bubbles as a result of non-spherical interface deformations is studied both numerically and experimentally. The Gerris flow solver is used to solve for a simplified model of the oscillation of a gas bubble in an incompressible liquid. In particular, we solve for the 3D conservation equations in both phases in a system where the total volume changes in the gas are imposed. Assuming a uniform pressure within the bubble, the conservation equations inside the bubble can be rewritten as a function of the temporal evolution of the bubble's volume. Thus, using volume change rates experimentally measured, we identify different regimes in which the bubble deformation induces a net translation velocity significantly larger than the one obtained with models assuming spherical symmetry. We explore the effect of three parameters: Weber number, dimensionless intensity of the pressure wave and relative distance of the source of the non-spherical perturbation. We support the conclusions extracted from the numerical analyses with experimental measurements of the bubble translational velocity exposed to shock waves.

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