Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Description of the instability transition modes of a bubble rising in still liquids[1] J.C. CANO-LOZANO, P. BOHORQUEZ, C. MARTÍNEZ-BAZÁN, Universidad de Jaen — In this research, we have investigated numerically the transition from straight to zigzag motion during the rise of a single gas bubble of diameter D in a pure-clear stagnant liquid, for the limiting case $\rho_g/\rho_l \ll 1$ and $\mu_g/\mu_l \ll 1$, where ρ is density, μ is dynamic viscosity, and subindices g and l denote gas and liquid phases, respectively. The transition is determined in terms of the Reynolds, $Re = \rho_l\, g^{1/2}\, D^{3/2}/\mu_l$, and Bond, $Bo = \rho_l\, g\, D^2/\sigma$, numbers as set of nondimensional, independent parameters governing the flow dynamics, in which g is the acceleration due to gravity and σ is the surface tension. Subsequently, the neutral curve for the onset of zigzag motion is characterized in the $\{Re,\, Bo\}$-plane.The transition curve is determined computing the real shape of the ascending bubble. Thus, we discuss the effect of the bubble shape and aspect ratio on the instability characteristics of the bubble wake. In particular, we observed that the onset of the zigzag instability begins with the loss of axisymmetry of the wake, developing two counter-rotating vortices, which exhibit a symmetry plane.

[1]Supported by the Spanish MICINN, Junta de Andalucía and EU Funds under projects DPI2008-06624-C03-02 and P07-TEP02693.

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Date submitted: 10 Aug 2011

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