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Air bubble break-ups by vertical oscillations in micro- and normal gravity environments HARUNORI YOSHIKAWA, PASCAL KUROWSKI, PHILIPPE PETITJEANS, PMMH -UMR7636, Paris, France, FARZAM ZOUESHTIAGH, LML -UMR8107, Lille, France, HERVE CAPS, GRASP -Univ. de Liège, Liège, Belgium — Dynamics of a bubble subjected to vertical oscillations is studied experimentally in micro- and normal gravity environments. A large air bubble (typically $D = 1.8$ cm in volume equivalent diameter) is sealed with a surrounding liquid in a cell oscillating vertically. The bubble breaks up when the acceleration of the cell exceeds a certain value a_{cr}. This critical acceleration a_{cr} is substantially smaller in micro-gravity environment than in normal gravity environment. In both environments, a_{cr} is found to be constant for a given surrounding liquid when the cell's oscillation amplitude A is large in comparison with the bubble size D. It is also found that a_{cr} increases rapidly with decreasing A below the bubble size D. Influence of surrounding liquid viscosity is investigated by experiments with surrounding liquids of different viscosities. An increase of kinematic viscosity by a factor 10^2 (from 1 cSt to 100 cSt) is found to lead a 2-2.5 times larger critical acceleration in both environments. Experimentally obtained critical accelerations are discussed, being compared with a simple model based on hydrodynamic instability of an accelerated interface.

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