Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

The rich life of light rising spheres JACQUES MAGNAUDET, IMFT/CNRS, ALICE LIEU, FRANCK AUGUSTE, IMFT — The straight path of spheres falling or rising in a weakly viscous fluid is known to become unstable beyond a critical value of the so-called Archimedes number Ar, a Reynolds number built on the gravitational velocity scale. Various styles of non-vertical paths have been reported so far: steady or oscillating oblique, planar zigzags, three-dimensional chaotic, etc. However despite careful computations and experiments, there is currently no consensus as regards the possible critical density ratio m* below which significant departures from straight (vertical or oblique) path are observed. To revisit this question, we carry out a detailed DNS study focused on rising spheres (m*<1) in the range $150 \leq \mathrm{Ar} \leq 350$. Non-straight paths with significant horizontal excursions are observed throughout the whole range of m*. In addition to the various aforementioned types of paths we also identify other styles such as intermittent zigzagging/oblique paths and find that very light spheres describe highly nonlinear zigzags and have drag coefficients up to 15% beyond standard values.

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Date submitted: 01 Aug 2013 Electronic form version 1.4