Dynamics of single rising bubble in suspension

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Suspensions (i.e. particle-laden fluids) are prevalent in a wide range of industrial [1] and natural processes [2]. Mixing and instabilities occurring during gas release in such multiphase flows [3] may be crucial, for example, in oil recovery, gas sequestration, deep-sea mining. In this context, the present work studies the motion of a single bubble using a simple table-top experiment which consist of a neutrally buoyant non-Brownian suspension inside a Hele-Shaw cell. By carefully controlling the volume fraction of grains in the suspending Newtonian fluid (water/UCON$^{\mathrm{TM}}$mixture), the bubble rise velocity is measured for various bubble diameters. The evolution of the bubble rising velocity with its diameter is similar to that the one it would have in a classical Newtonian fluid [4]. As expected, when the packing fraction is increased and therefore, the suspension effective viscosity [5], the rise velocity drops. Nonetheless, the bubble can present a deformed shape and may fragment at large packing fraction.

Références

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