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Dynamics of swarms of buoyancy-driven bidispersed bubbles at O(100) Reynolds number ASGHAR ESMAEELI, Southern Illinois University at Carbondale — Direct numerical simulations of buoyancy-driven bubbly flows, where the flow around each bubble is fully resolved and viscosity, inertia, and surface tension are accounted for, have already been used to study bubbly flows up to O(100) Reynolds number. While these simulations have yielded considerable new insight into the dynamics of homogeneous bubbly flows in terms of the correlations of the average behavior of the flow with the microstructure, so far the majority of them have been concerned with the flows comprising of equal sized (monodispersed) bubbles. In real applications, however, the bubbles will have a spectrum of sizes and since the buoyant forces scale up with the bubble size, it is expected that the dynamics of bubbly flows will be drastically influenced by the size distribution of the bubbles. Studies on bidispersed bubbly systems constitute a good starting point for elucidating the role of size distribution effect. However, so far only a handful of such studies have been performed. The goal of the current investigations is to extend the parameter range of the earlier studies by performing large scale simulations of three-dimensional bi-dispersed bubbles. Here, the main controlling parameters are the ratio of the void fractions of species and the volume ratio of the bubbles. The investigations will be, therefore, focused on characterizing the global behavior of the bubbly systems as a function of these parameters.

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