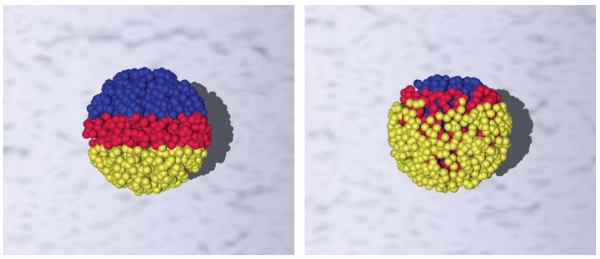

FIG. 1. (Enhanced online). Initial drop (left) and settling drop very shortly after the release (right).

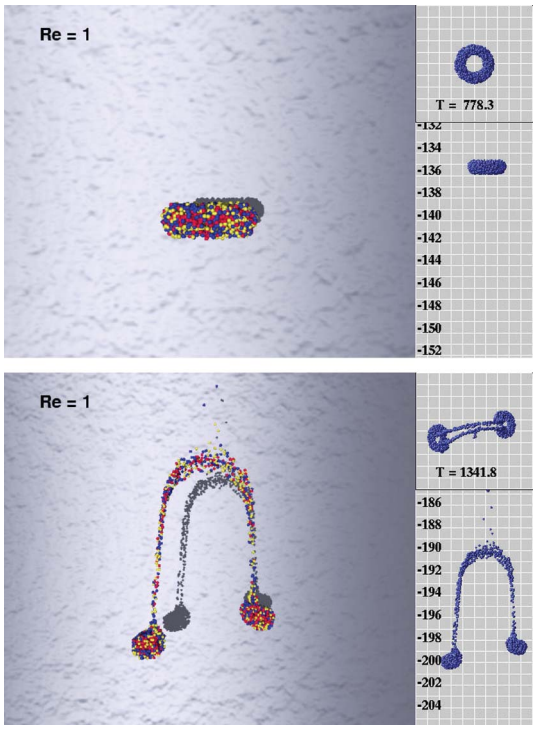

FIG. 2. Breakup of suspension drop settling at $Re_d=1$.

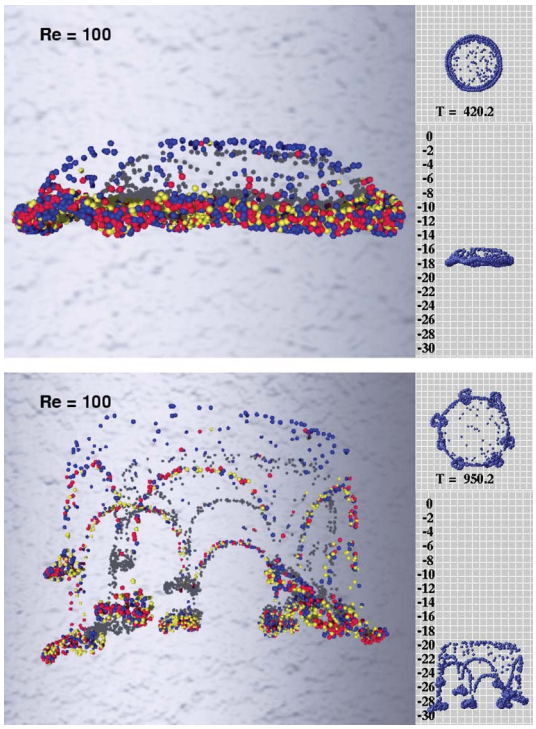

FIG. 3. Breakup of suspension drop settling at $Re_d=100$.

Settling and breakup of suspension drops

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A suspension drop is an initially spherical swarm of small particles that are suspended in fluid at rest. Under the influence of gravity this drop settles, and it can undergo a complex shape evolution with subsequent disintegration. We performed numerical simulations of suspension drops settling at moderate drop Reynolds numbers $1 \leqslant Re_d \leqslant 100$.[1] Here, we show two typical examples of the drop breakup.

Figure 1 displays the initial drop (left) and the settling drop very shortly after the release (right). The particles are color-coded to visualize their motion inside the drop. This initial stage is similar for all drop Reynolds numbers. However, the subsequent shape evolution and disintegration strongly depend on the Reynolds number. In the case of very small Reynolds numbers, $Re_d \ll 1$, the drop retains a compact spherical shape and a few particles leak into a tail emanating from the rear of the drop (not shown here). In the case of $Re_d=1$ the drop deforms into a torus that grows in diameter while settling. Eventually two bulges form and the torus breaks up into two secondary blobs (Fig. 2). In the case of $Re_d=100$ the disintegration process occurs much faster than in the foregoing example. Also, the torus is now spanned by a membrane of dilute particles and finally breaks up into a larger number of secondary blobs (Fig. 3).

[1]T. Bosse, C. Härtel, E. Meiburg, and L. Kleiser, "Numerical simulation of finite Reynolds number suspension drops settling under gravity," Phys. Fluids **17**, 037101 (2005).

