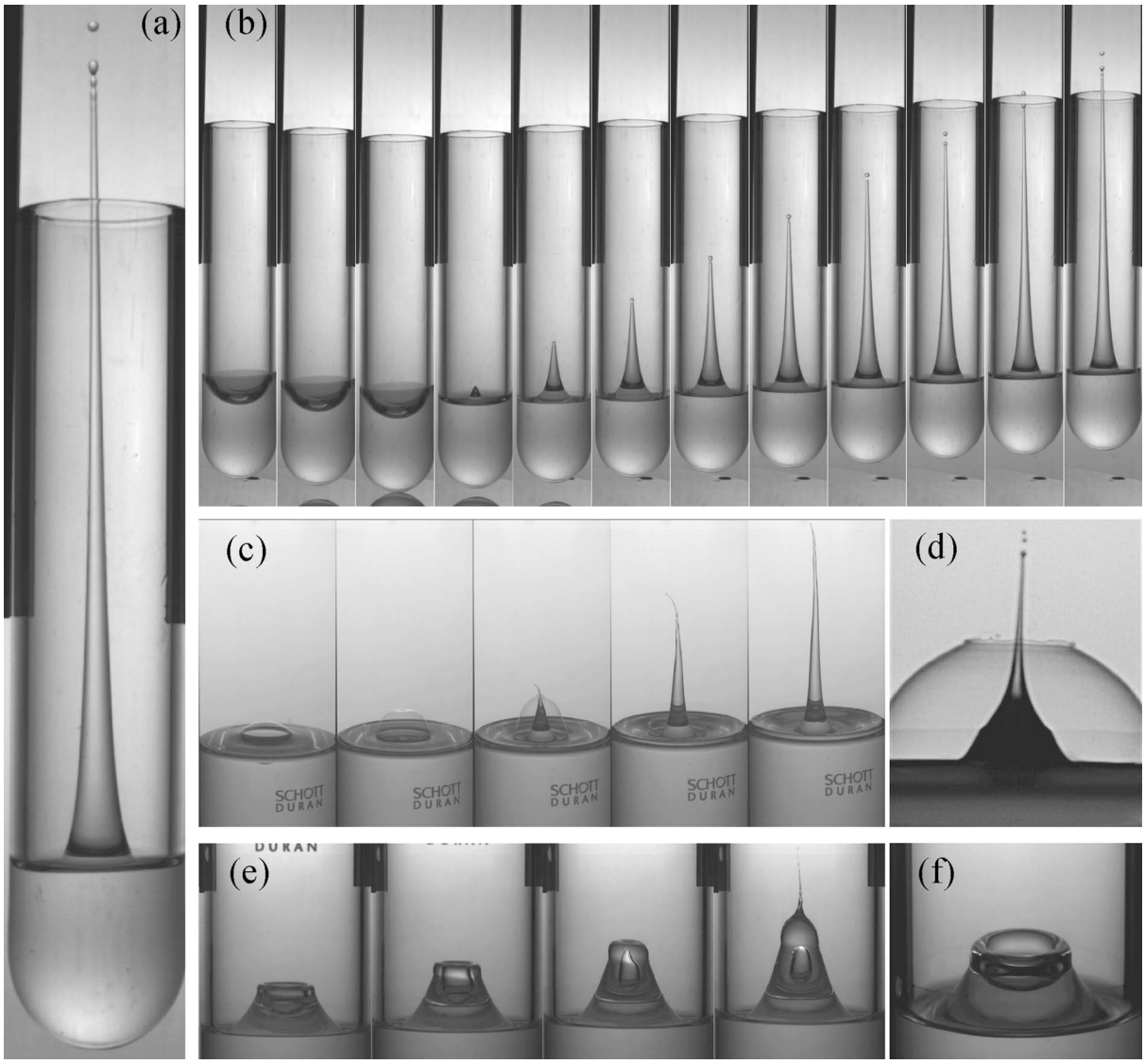

FIG. 1. Jet formation observed just after impact when the free surface is initially deformed with a meniscus [(a)–(b)], bubble [(c)–(d)], or wave [(e)–(f)].

Cavity jets

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A tube filled with a perfectly wetting liquid falls axially by its own weight. In its gravity-free reference frame, the liquid interface deforms by surface tension into a hemispherical shape. At the impact of the tube on a rigid floor, the interface curvature reverses violently, forming a concentrated jet [Figs. 1(a) and 1(b)], thanks to a purely inertial mechanism that relies on the initial surface deformation.[1] Another way to create a cavity is to deposit a bubble at the liquid surface. In that case, the cavity radius is that of the bubble. At impact, a sharp needle emerges from the cavity, eventually piercing the bubble [Figs. 1(c) and 1(d)]. The liquid surface may also be corrugated in a more complicated manner by traveling capillary waves at the moment of impact. These corrugations give the imprint of the emerging liquid shapes, which may have the form of a hollow cylinder eventually collapsing and ejecting a violent thread [Figs. 1(e) and 1(f)].

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[1]A. Antkowiak, N. Bremond, S. Le Dizès, and E. Villermaux, "Short-term dynamics of a density interface following an impact," J. Fluid Mech. **577**, 241 (2007).

