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The rupture dynamics of ultra-viscous bubbles JAMES BIRD, Massachusetts Institute of Technology, HOWARD STONE, Princeton University, JOHN BUSH, Massachusetts Institute of Technology — When air bubbles rise to the surface of a liquid, they create a thin-film dome that eventually ruptures. In liquids with relatively low viscosity, the rupture dynamics are dominated by surface tension and inertia and typically occur over a period of milliseconds. In liquids with relatively high viscosity, the viscous dissipation slows the dynamics enough that gravity, rather than surface tension, is believed to be responsible for the bubble collapse. However, here we demonstrate that gravity is responsible for neither the collapse nor the resulting instability that wrinkles the film. Using a combination of experiments and theory, we investigate why capillary forces display attributes that are normally exclusive to gravitational forces.

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