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Self-propulsion of boiling droplets on thin oil films[1] VICTOR LEON, KRIPA VARANASI, Massachusetts Institute of Technology MIT — Droplet self-propulsion strategies have been studied for applications in self-cleaning, anti-icing, and anti-fouling surfaces. To increase the velocity of a droplet on a surface, one would typically think to minimize contact between the droplet and the surface. Here we investigate the self-propulsion of boiling droplets that, despite their contact with a viscous film, attain velocities comparable to those of levitating Leidenfrost droplets on ratchets. The propulsion of the droplet originates from the asymmetric release of vapor from beneath the boiling droplet. The effect of surface texture, viscosity, temperature, and droplet size are explored. We develop a scaling model that predicts, with good agreement, the droplet velocities by balancing the viscous dissipation in the oil film with the momentum created by vapor ejection beneath the boiling droplet.

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