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Bouncing and rolling motions of capillary Leidenfrost drops on a micro-ratchet KYRA STEPHANOFF, PAUL STEEN, Cornell University, HENRI LHUISSIER, DETLEF LOHSE, Physics of Fluids, University of Twente — Capillary drops falling onto a micro-ratchet that is heated to temperatures 275 C $\leq$ T $\leq$ 350 C, bounce off a layer above the ratchet multiple times before settling down to the motion typically observed when the Leidenfrost effect is present. The deformation of the drops is asymmetrical about the y-z plane through the center of the drops as the drops move in the x direction. The magnitude of the asymmetrical deformations varies with ratchet temperature as does the number of bounces. Videos show that, when a drop settles down to its "rolling" regime, the fluid within a drop moves in a counter-clockwise direction. The counter-clockwise internal motion and the asymmetric deformations of a bouncing drop indicate, albeit indirectly, that the fluid in the ratchet cavities is moving clockwise. A simple model that correlates well with the experimental observations is presented.

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