

Abstract Submitted
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Leidenfrost drops on liquid baths: theory BENJAMIN SOBAC, ALEXEI REDNIKOV, Universit libre de Bruxelles, TIPs - Fluid Physics, LAURENT MAQUET, BAPTISTE DARBOIS-TEXIER, ALEXIS DUCHESNE, MARTIN BRANDENBOURGER, STPHANE DORBOLO, Universit de Lige, Institute of Physics, GRASP, PIERRE COLINET, Universit libre de Bruxelles, TIPs - Fluid Physics — It is well known that a liquid drop released over a very hot surface generally does not contact the surface nor boils but rather levitates over a thin vapor film generated by its own evaporation (Leidenfrost effect). In particular, the case of a hot (and flat) solid substrate has been extensively studied in recent years. In contrast, we here focus on Leidenfrost drops over a superheated liquid bath, addressing the problem theoretically and comparing our predictions with experimental results, detailed in a separate talk. We predict the geometry of the drop and of the liquid bath, based on the hydrostatic Young-Laplace and lubrication equations. A good agreement is observed with the available experimental data concerning the deformation of the liquid bath. The modeling also yields a rather complete insight into the shape of the drop. As in the case of a solid substrate, the vapor layer generally appears to be composed of a vapor pocket surrounded by a circular neck. The influences of the superheat and of the drop size are parametrically investigated. A number of scaling laws are established. Unlike the case of a solid substrate, no chimney instability was found in the range of drop size studied.

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