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Droplet impact on highly viscous liquid: from experiments to numerics ZHEN JIAN, Institut D'Alembert, CNRS & UPMC (Paris 06), France; Key Laboratory of Thermo-Fluid Science and Engineering of MOE, Xi'an Jiaotong University, China, GUY-JEAN MICHON, CHRISTOPHE JOSSERAND, STEPHANE ZALESKI, PASCAL RAY, Institut D'Alembert, CNRS & UPMC (Paris 06), UMR 7190, case 162, 4 place Jussieu, 75005 Paris, France, ZENGYAO LI, WENQUAN TAO, Key Laboratory of Thermo-Fluid Science and Engineering of MOE, Xi'an Jiaotong University, China — A numerical model is proposed to deal with the triple-phase impacting dynamics, of which a droplet of normal liquid impacts on a highly viscous liquid basin. Viscous effect is dominant during the dynamics as compared to the inertia and the surface tension. A liquid viscosity ratio m_l is introduced to measure the viscosity deviation from a normal liquid as $m_l = \mu_{basin}/\mu_{droplet,normal}$. Direct numerical simulations were executed with a code called Gerris. By increasing the liquid viscosity ratio m_l, a continuous transition from L/L impact to L/S impact can be achieved. Two regimes are identified: wave-like regime and solidification regime. Experiments of droplet impacting on highly viscous liquid were also executed. Droplets of ethanol impact on a liquid basin of honey in a vacuum chamber where the gas pressure could be varied. A similarity to the impact on solid was observed, liquid basin performed as a solid and the complete suppression of splash was also observed by decreasing the gas pressure as reported for impacts on solid. Droplet shapes predicted by our simulations agree well with those observed in experiments.

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