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Dynamic of water droplets impacting on laser textured surfaces

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In the study of surfaces with various properties, the process of droplet spreading and splashing upon collision is a key phenomenon that plays a significant role in various natural and practical applications [1]. Examples of such applications include inkjet printing, coating spraying, pesticide spraying, spray cooling, and anti-icing measures [2]. The interaction of droplets with solid surfaces, depending on wetting properties, involves a range of diverse processes, including spreading, rebounding, and splashing. These phenomena are influenced by surface properties such as roughness and wettability, as well as the physicochemical properties of liquids, including density, viscosity, surface tension, and droplet velocity. Additionally, the interaction of droplets with heated surfaces is a crucial phenomenon in spray cooling, capable of dissipating significant heat flux and holding substantial potential for cooling electronic devices [3]. The dynamics of droplet interaction with heated surfaces is a complex process dependent on numerous parameters, including environmental conditions, droplet characteristics, and surface attributes such as roughness, micro- and nanostructure, as well as wettability properties [4].

In this paper, we review our recent results on the study of the dynamics of interaction between a droplet and a textured surface. Different interaction modes are found depending on the type of microstructure and surface temperature. Experimental and numerical results are compared.

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