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Droplet impact on asymmetric microstructures SUSUMU YADA, Department of Engineering Mechanics, KTH Royal Institute of Technology, BLANDINE ALLAIS, cole Normale Suprieure de Lyon, FREDRIK LUNDELL, Department of Engineering Mechanics, KTH Royal Institute of Technology, WOUTER VAN DER WIJNGAART, Division of Micro and Nanosystems, KTH Royal Institute of Technology, GUSTAV AMBERG, Sodertorn University, SHERVIN BAGHERI, Department of Engineering Mechanics, KTH Royal Institute of Technology — The impact of liquid drops on a rigid surface is central in cleaning, cooling and coating processes in both nature and industrial applications. However, it is not clear how details of pores, roughness and texture on the solid surface influence the spreading stages of the impact dynamics. Here, we experimentally study drop impacting onto surfaces textured with asymmetric (tilted) ridges and quantitatively discuss the influence of the asymmetric microstructures with the maximum spreading radius of the droplet. We define the line-friction capillary number $Ca_f = \mu_f V_0/\sigma$ (where μ_f, V_0 and σ are the line friction parameter, impact velocity and surface tension, respectively) as a measure of the importance of the topology of surface textures for the dynamics of droplet impact. We show that when $Ca_f \ll 1$, the contact line speed in the direction against the inclination of the ridges is set by line-friction, whereas in the direction with inclination the contact line is pinned at acute corners of the ridge. When $Ca_f \gg 1$, impact inertia of the droplet entirely governs spreading and the geometric details of non-smooth surfaces play little role.

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