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Drop splash on a smooth, dry surface GUILLAUME RIBOUX, JOSE MANUEL GORDILLO, Universidad de Sevilla, ALEXANDER KOROBKIN, University of East Anglia — It is our purpose here to determine the conditions under which a drop of a given liquid with a known radius R impacting against a smooth impermeable surface at a velocity V, will either spread axisymmetrically onto the substrate or will create a splash, giving rise to usually undesired star-shaped patterns. In our experimental setup, drops are generated injecting low viscosity liquids falling under the action of gravity from a stainless steel hypodermic needle. The experimental observations using two high speed cameras operating simultaneously and placed perpendicularly to each other reveal that, initially, the drop deforms axisymmetrically, with $A(T)$ the radius of the wetted area. For high enough values of the drop impact velocity, a thin sheet of liquid starts to be ejected from $A(T)$ at a velocity $V_{jet} > V$ for instants of time such that $T \geq T_c$. If V_{jet} is above a certain threshold, which depends on the solid wetting properties as well as on the material properties of both the liquid and the atmospheric gas, the rim of the lamella dewets the solid to finally break into drops. Using Wagner's theory we demonstrate that $A(T) = \sqrt{3RVT}$ and our results also reveal that $T_c \propto We^{-1/2} = (\rho V^2 R/\sigma)^{-1/2}$ and $V_{jet} \propto We^{1/4}$.

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