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Instabilities of spreading and wetting fronts of impacting drops[1]

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— We experimentally observed the instabilities of both the spreading and wetting fronts of impacting drops of different physical properties and impact parameters. Both the instabilities were simultaneously observed with high-speed backlighting and total-internal-reflection (TIR) imaging. The backlighting method is suitable for the observation of the dynamics of spreading rim, while TIR for the contact line. Both the wave lengths of the instabilities were quantitatively evaluated with the Fourier transform and were compared. As a result, we found that both the wavelengths were in accordance with each other for water, while for glycerol-water solutions the wavelengths showed no correlation We also found that the criteria for the wetting instability cannot be determined only by capillary number of the contact line dynamics. Moreover, we found that the wettability between a solid surface and an impacting drop greatly affects the width of thin air film region located in between the spreading and the wetting fronts.

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