Abstract Submitted
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Quantification of Wind-Driven Water Droplets over Surfaces with Different Wettabilities HUI HU, ZICHEN ZHANG, LIQUN MA, Iowa State University — In the present study, a comprehensive experimental study is performed to quantify the transient runback behavior of water droplet/rivulet flows as driven by boundary layer winds over the surfaces of test plates with different wettabilities. The experimental study is conducted in a low-speed wind tunnel available at Iowa State University (ISU-IRT) A suite of advanced flow diagnostic techniques, which include high-speed photographic imaging, digital image projection (DIP), particle image velocimetry (PIV), are used to quantify the transient runback behavior of water droplets over test plates as driven by the boundary layer winds. Water droplets with their volumes changing from 10 to 100 μL are tested under different incoming wind speed. In addition to measuring the airflow velocity field around the wind-driven water droplets/rivulets, dynamic shape changes and stumbling runback motion of the water droplets/rivulets are also measured in real time in terms of water film thickness distribution, contact line moving velocity and wet surface area over the test plates with different wettabilities. The findings derived from the present study would be very helpful to gain a better understanding about the important microphysical process, which could lead to improvements of icing accretion models for more accurate prediction of ice formation and accretion process as well as the development of effective anti-/de-icing strategies for aircraft icing mitigation. -/abstract- Zichen Zhang, Liqun

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