Abstract Submitted
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Thermohydronamics of Multiple Droplet Streams Impinging on Liquid Film[1] JORGE ALVARADO, Texas AM University, JAYAVEERA MUTHUSAMY, W. L. Gore and Associates, TAOLUE ZHANG, Molex, REZA SADR, ANOOP KANJIRAKAT, Texas AM University-Qatar — The thermohydrodynamics of multiple stream droplet trains impinging on a thin liquid film was investigated numerically and experimentally. Numerically, CFD simulations under uniform surface heating were performed by using the Coupled Level Set-Volume-of-Fluid (CLS-VOF) method. A structured 3D half-symmetric mesh with dynamic mesh adaption was used to capture the formation and propagation of the droplet-induced crown and secondary droplets with time-dependent spatial and temporal resolutions. A piezo-electric droplet generator was used to produce mono-dispersed droplets with controlled droplet properties, including droplet diameter, velocity, droplet Weber number and droplet stream spacing. High-speed imaging was used to capture droplet-induced hydrodynamics and the morphology of the droplet-induced liquid film. A reasonable agreement was obtained between numerical and experimental results based on several factors including impact crater properties and surface temperature profiles. In summary, numerical and experimental results reveal that Weber number, droplet horizontal impact spacing and the overall impingement pattern play a significant role on cooling process and hydrodynamics during multiple droplet train impingement on a liquid film.

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