Abstract Submitted
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Numerical simulation of liquid-layer breakup on a moving wall due to an impinging jet[1] TAEJONG YU, HOJOON MOON, DONGHYUN YOU, POSTECH, DOKYUN KIM, ANDREY OVSYANNIKOV, Center for Turbulence Research — Jet wiping, which is a hydrodynamic method for controlling the liquid film thickness in coating processes, is constrained by a rather violent film instability called splashing. The instability is characterized by the ejection of droplets from the runback flow and results in an explosion of the film. The splashing phenomenon degrades the final coating quality. In the present research, a volume-of-fluid (VOF)-based method, which is developed at Cascade Technologies, is employed to simulate the air-liquid multiphase flow dynamics. The present numerical method is based on an unstructured-grid unsplit geometric VOF scheme and guarantees strict conservation of mass of two-phase flow, The simulation results are compared with experimental measurements such as the liquid-film thickness before and after the jet wiping, wall pressure and shear stress distributions. The trajectories of liquid droplets due to the fluid motion entrained by the gas-jet operation, are also qualitatively compared with experimental visualization. Physical phenomena observed during the liquid-layer breakup due to an impinging jet is characterized in order to develop ideas for controlling the liquid-layer instability and resulting splash generation and propagation.

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