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Thermally driven coalescence in thin liquid film flowing down a fiber[1] CLAUDIA FALCON, HANGJIE JI, Department of Mathematics, University of California, Los Angeles, ABOLFAZL SADEGHPOUR, ERFAN SEDIGHI, Y. SUNGTAEK JU, Mechanical and Aerospace Engineering Department, University of California, Los Angeles, ANDREA BERTOZZI, Department of Mathematics Mechanical and Aerospace Engineering Department, University of California, Los Angeles — We aim at understanding the dynamics of thin fluid film flowing down a vertical fiber under streamwise thermal effects, both experimentally and theoretically. Recent studies have shown the importance of determining the regime transition from absolute to convective instability. Unlike previous work, our experiments demonstrate that the onset of such irregular wavy regime can also be induced by thermal gradient away from the nozzle. The new model includes spatial-dependent viscosity and surface tension due to inhomogeneous temperature field along the fiber. The predicted coalescence positions based on this theory are useful in the design of heat and mass exchangers for applications that include cooling systems and desalination.

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