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Laminar flow over a three-dimensional thin film THOMAS WARD, Department of Aerospace Engineering, Iowa State University — Two-dimensional laminar flow over a three-dimensional thin liquid film will be investigated through mostly computational analysis. The boundary layer thin film evolution equations have been developed using the Blasius boundary layer solution for the external phase with lubrication analysis for the thin liquid film. The capillary length and the dynamic pressure are used as the length and pressure scale to non-dimensionalize the equations. The resulting dimensionless equations depend on the Reynolds, Re, and Weber, We, numbers and the two fluids viscosity ratio, λ. The dimensionless boundary layer thin film equation is then solved using a $4th$ order Runge-Kutta-Merson method. Sinusoidal perturbations of varying amplitude and wavelength in the initial thickness of the thin film are considered. Above certain values of the initial perturbation and parameters Re, We, and λ the thin film's deformation is enhanced.

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