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Dynamics of water bells formed on the underside of a horizontal plate ELEANOR BUTTON, JOHN SADER, Department of Mathematics and Statistics, The University of Melbourne, GRAEME JAMESON, Centre for Multiphase Processes, The University of Newcastle — We study the thin film flow generated when a vertical liquid jet impacts on the underside of a large horizontal plate, spreads radially to an abrupt point, and then falls of its own accord. The fluid falls in threads, which may coalesce to form a water bell. The radius of departure from the plate is seen to be strongly dependent on the flow rate of the impinging jet. The stability of the thin film flow along the plate is considered as a mechanism for the fluid's departure from the plate, and an analytical model for the departure radius is developed. When a water bell has been formed, and the flow rate is altered, many interesting shapes are produced, that are dependent on shapes at previous flow rates. We discuss the dependence of this hysteresis, and present a leading order theory for the bell shape under a regime of changing flow rate. All models are compared with experimental results spanning two orders of magnitude of viscosity.

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