

An Experimental Study of Free-Surface Film Flow of Water and Methanol on the Outside of a Vertical Cylinder

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Abstract: *The occurrence and applications of liquid film flow has increased considerably as technology developed. Film flow is encountered in the process industries, cooling towers, evaporation condensers, chemical reactors, and the combustion chambers of rocket motors. In studying two-phase flow, it has been found that a detailed knowledge of the phenomena occurring in film flow, with or without an adjacent gas stream would assist greatly in understanding many of the more complex type of two-phase flow. In this paper, the behaviour of water and methanol liquid films flowing down the outside of a vertical cylinder is investigated experimentally. Measurements of film thickness versus axial distance are made for water and methanol in the Reynold's Number range 300-1400. For a 100mm diameter cylinder and initial film thickness of 0.5, wave amplitudes of up to 0.7mm and wave frequencies of up to 67 cycles per second were measured. Height of waves tends to increase with axial distance and bigger waves tend to have higher frequencies.*

Keywords: *Film flow, film thickness, axial distance gas stream, methanol liquid, process industries*