

FLOW PATTERNS AND CLEANING BEHAVIOUR OF INCLINED LIQUID JETS IMPINGING ON ANGLED WALLS

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ABSTRACT

Liquid jets are widely used in tank cleaning operations in the food and related sectors. Morison and Thorpe (2002) reported an experimental investigation of the flow patterns and cleaning behaviour of horizontal jets impinging on vertical walls. The model of Wilson et al. (2012) described Morison and Thorpe's flow pattern data well: the model is here extended to describe the flow pattern generated by a liquid jet, inclined at a given angle to the horizontal: the jet impinges on a plate inclined at a known angle to the vertical. The theory is compared with experimental data for water impinging on Perspex and glass plates. Two important dimensions are evaluated: (i) the horizontal width of the fast moving radial flow zone (the region bounded by the film jump, the feature similar to a hydraulic jump) at the level of the impingement plane; (ii) the distance to which the radial flow zone extends above the point of impingement. Both are described reasonably well by the model. A short study of cleaning of layers of washable paint on glass, similar to the tests reported by Morison and Thorpe, show that the cleaning model recently developed by Wilson et al. (2014) gives a good description of the initial cleaning of such layers using impinging stationary coherent water jets.