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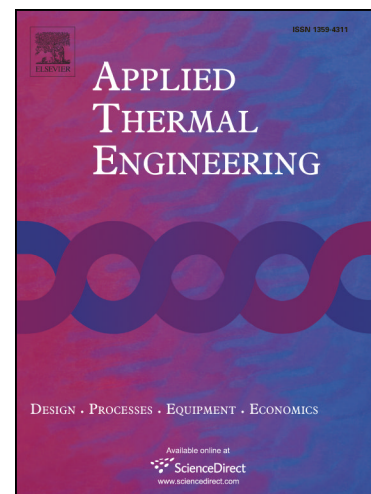
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# Experimental investigation of condensation flows in circular cross-section channel

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## Abstract

In this work, condensation flows of pure ethanol in a horizontal water-cooled circular cross-section heat exchanger were investigated for a mass velocity ranging between 30 and 100 kg.m<sup>-2</sup>.s<sup>-1</sup>. The inner channel of condensation has inner and outer diameters of 4 mm and 10 mm, respectively, with a heat exchange length of 1020 mm. An adiabatic section consisted of a transparent circular cross-section channel, of 4 mm inner diameter and of 130 mm visible length, was placed downstream of the condenser in order to visualise the condensation flows by shadowgraph technique. Two main flow regimes were identified: the wavy-stratified regime and the wavy-annular regime. A flow regime map was developed and compared with flow regime maps available in the literature. Besides, the local vapour quality and internal heat transfer coefficient were determined and compared with prediction models of the literature. Finally, the total pressure drop in the condenser was determined.

**Keywords:** convective condensation; circular cross-section channel; flow regimes; heat transfer coefficient; pressure drop; experimentation

## NOMENCLATURE

$c_p$	specific heat (J.kg <sup>-1</sup> .K <sup>-1</sup> )
$D$	diameter (m)

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