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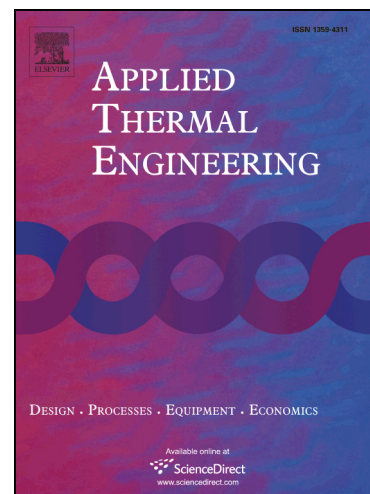
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Flow Pattern Transition During Condensation of R134a and R1234ze(E) in Microchannel Arrays

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ABSTRACT

Two-phase flow pattern transition during the condensation of R134a and R1234ze(E) was experimentally investigated in a microchannel array made of borosilicate glass cooled symmetrically on the top and bottom by forced convection of water. The microchannel array consisted of 50 channels with the aspect ratio of 2.46, the hydraulic diameter of 301.6 μm and the length of 50 mm. Saturation temperatures are 20 to 25°C with mass fluxes varying from 6 to 50 $\text{kg/m}^2/\text{s}$. Observed patterns are annular flow, steady injection flow, quasi-symmetric wave flow and slug/bubbly flow. In addition, three flow pattern transition modes including steady injection, wave-coalescence injection, and liquid bridging were observed and mapped in terms of liquid Webb number versus condensation number. The steady injection transition was more studied in detail by measuring the bubble length variation and the moving velocity of bubbles and slugs with different mass fluxes of R134a and R1234ze(E). The transition mechanism of injection flow was identified by analyzing the force balance based on the

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