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NUMERICAL STUDIES ON SINGLE-PHASE MICRO-CHANNEL HEAT SINK WITH MULTIPLE INLETS ALONG THE CHANNEL

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Abstract Combined micro-channel flow and jet impingement can be one of the methods to maximise the benefits of micro-channel heat sinks but very less research has been done in this direction. However, there are difficulties and limitations involved in implementing both the techniques together, for e.g., channel flow blockages or stagnations caused by multiple jets along the channel. In the present study, to overcome these limitations, multiple secondary inlets along the channel, besides the main inlet, are proposed such that the flow takes place in only one direction. This avoids flow blockage, and still exploits some benefits of jet impingement. Six different cases were modelled and studied using commercial CFD software ANSYS FLUENT to determine the effects of size and inclination of secondary inlets on the heat sink performance. The best performance is shown by the secondary inlets with 50% reduction in the successive diameters and inclined at 90° with the horizontal. The results show reduced heat sink wall temperature, increased uniformity in wall temperature and higher heat transfer coefficients, however, at the cost of higher pressure losses.