A numerical investigation of the thermal-hydraulic characteristics of perforated plate fin heat sinks

The benefits of using notch, slot and multiple circular perforations in plate fin heat sinks (PFHSs), are investigated numerically, using a conjugate heat transfer model. Comparisons show that each type of perforation can provide significantly reduced pressure drops over PFHSs but that fins with slot perforations provide the most effective design in terms of heat transfer and pressure drop. The practical benefits of each type of perforated fin for micro-electronics cooling is also explored and their capabilities of achieving low processor temperatures for reduced mechanical power consumption are quantified