

Numerical investigation on Metal Foam Pin-Fin Heat Sink (MFPFHS) has been conducted and compared to the traditional Solid Pin-Fin Heat Sink (SPFHS). For investigating turbulent convection heat transfer and friction factor characteristics in the MFPFHS, the 3D steady continuity, momentum, and energy equations are discretized using the finite volume approach. The key parameters investigated here are; the pin diameter ratio (DR) i.e., reducing the upper diameter and increasing the lower diameter simultaneously, the number of pins and the pins' height ratio (HR) i.e., reducing the pin height and increasing its diameter simultaneously. The overall pin volume is retained constant throughout the whole study. The results show that (i) the MFPF exhibit a superior enhancement in the heat dissipation and reduction in the frictional losses compared to the solid pin-fin (SPF), (ii) a great heat transfer and PEC enhancement is observed when DR increases associated with a decrease in the friction factor, (iii) heat transfer and performance evaluation criteria (PEC) enhancement (with a maximum value of 3.7) is obtained when the number of MFPF increases with a large decrease in the friction factor, (iv) high augmentation in PEC with a peak value of 3.8 but up to a certain value is seen, however, with an association of high increase in the friction factor.