#### Abstract

This paper contributes to the field of improving the performance of heat exchangers using metal foam (MF) full-filled and partially/periodically-filled within the gap between the two pipes. The effect of configuration and arrangement of copper MF (15PPI and porosity of 0.95) installed on the outer surface of the inner pipe of a counter-flow double-pipe heat exchanger on the thermal and hydraulic performance was studied experimentally. The test section consisted of concentric two pipes; the inner pipe which was made of copper while the outer pipe was a Polyvinyl chlo-ride. Air was used as a working fluid in both hot and cold sides. A wide cold air flow rate range was covered from 3 to 36 m3/h which corresponds to Reynolds number (Re) range from 2811 to 31,335. The hot air flow rate was kept constant at 3m3/h. The temperature difference (ΔT) be-tween the inlet hot air and inlet cold air was adopted to be (20°C, 30°C, 40°C, and 50°C). The re-sults revealed that the higher Nusselt number (Nu) was at ΔT= 50°C and the thermal performance of the heat exchanger with the MF for all the arrangements was greater than the smooth heat exchanger. The highest and lowest friction factor was 1.033 and 0.0833 for the case 1 and 8, re-spectively, and the optimal performance evaluation criteria (PEC) was 1.62 for case 7 at Re = 2800. The Nu would be increased with a moderate increase in the friction factor by optimizing the arrangement of the MF. The two essential parameters that played an important role for in-creasing the PEC were the MF diameter and the MF arrangement along the axial length of the cold air stream.