

Experimental analysis carried out on various parameters of flow through micro-channels

Misba Jan* and M.Mursaleen Butt

Department of Mechanical Engineering, National Institute of Technology Srinagar 190006, India.

Email: basumisba@gmail.com

Abstract: This work attempts to provide the extensive study based on the experimental work performed on a micro-channel heat exchanger set-up. It signifies the various conditions which somehow affect the flow and heat transfer characteristics in micro-channels. In this experiment, the water is allowed to flow through the test section and once the desired pressure is obtained, note down the readings of temperature of water at the inlet outlet positions of the test section as well as the temperature of the oil from the temperature indicator only after the flow attains a steady state. Also, note down the reading of differential pressure of water through the test section from a digital manometer. Then start collecting the predetermined amount of water from the exit section in the collecting beaker and note down the time of collection in order to measure the flow rate. The test section contains total of 79 circular micro-channels each 45 mm long and having the hydraulic diameter of 279 μm . The micro-channels are arranged in circumferential manner on different Pitch Circle Diameters (PCD) in such a way that each micro-channel contains more or less equal volume of water. The micro-channel heat exchanger is instrumented with thermocouples and pressure taps to monitor the fluid flow and heat transfer through the micro-channels.

Keywords: Micro-channels, Fluid flow, Heat transfer characteristics, Hydraulic diameter, Thermocouples.

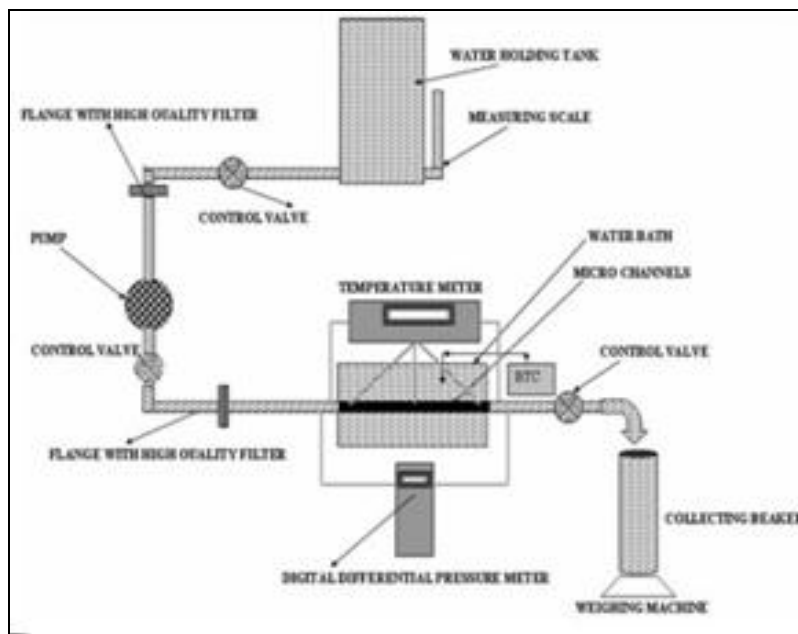


Figure 1: Schematic arrangement of the experimental setup.

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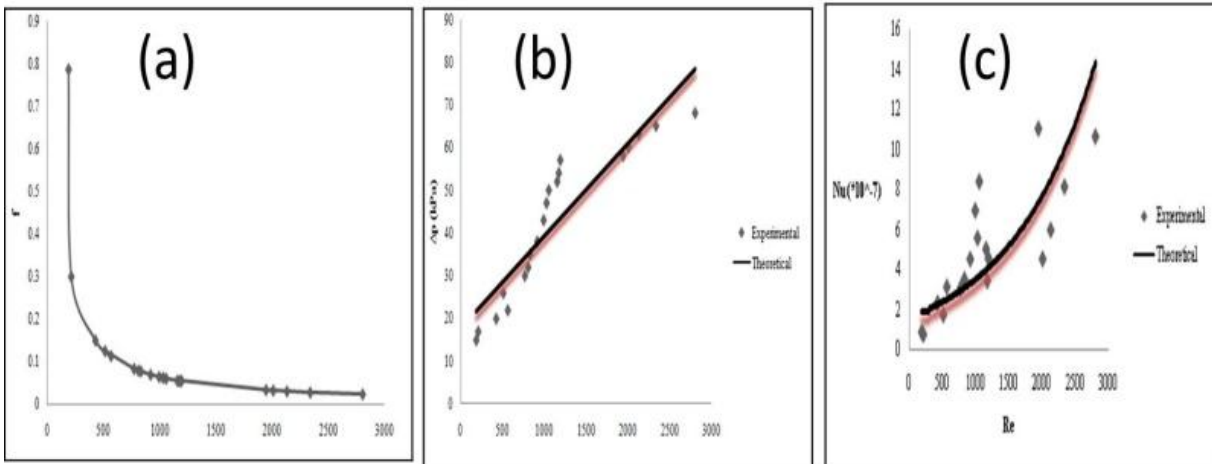


Figure 2: Experimental plot of (a) f versus Re , (b) Pressure drop versus Re and (c) Nusselt number versus Re in Micro-channel flow.

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