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INVESTIGATION OF LOW DENSITY FLUID FLOW THROUGH PARALLEL MICRO-CHANNELS

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Abstract

This paper investigates the experimental program to generate data for fluid flow through micro-channels. The two test sections used were of 47 and 50 micro-channels in rectangular cross-section of equivalent diameters 387 and 327 μm respectively. Each channel of length 192 mm were fabricated on a 304 stainless steel substrate (230 mm x 160 mm x 1.6 mm) by photo chemical etching process. Covering the top with another plate of 0.5 mm thickness formed the channels by vacuum brazing. The low density fluids used were air, ethanol, methanol and one ethanol-methanol mixture as flow media. Pressure drop and flow rate data were measured and used as raw data to evaluate friction factors in the micro-channels. Analysis of friction factor *vs* Reynolds number relation indicates that friction factor for liquid flow is same as that of normal channels in the laminar region and is higher in case of gas flow. Transition region lies in the range of Re>500 and transition starts at lower Reynolds number (Re~500) than that in normal channel. Transition was identified as the discontinuity in friction factor-Reynolds number data.

Keywords: Experiments, gas, alcohols, alcohol mixture, laminar, transition, friction factor and micro-channels.