INTISARI

Studi eksperimental mengamati karakteristik aliran dua fasa dan *pressure drop* pada saluran *microchannel* berpenampang persegi yang memiliki bagian perubahan luas penampang ekspansi. *Microchannel* berpenampang persegi dengan memiliki D_H = 0,5 mm di bagian *upstream* dan D_H = 0,8 mm di bagian *downstream*. *Microchannel* memiliki enam buah lubang *pressure taps* yang dihubungkan ke DPT (*Differential Pressure Transducer*) untuk mengukur distribusi tekanan pada *microchannel*. Variasi yang digunakan adalah kecepatan superfisial likuid (j_L) dengan rentang j_L= 0,1 – 1 m/s dan kecepatan superfisial gas (j_G) dengan rentang j_G= 0,67 – 20 m/s. Selain itu, Fluida yang digunakan adalah Fluida non-*Newtonian* berupa CMC – Nitrogen dan *Newtonian* berupa Air – Nitrogen digunakan sebagai pembanding. Aliran dengan fluida non-*Newtonian* (CMC 0,4%) memiliki *pressure drop* yang lebih tinggi dibanding fluida *Newtonian* (Air). Fenomena penurunan tekanan terjadi lebih besar akibat perubahan luas penampang baik pada fluida *Newtonian* maupun *non-Newtonian*. Karakteristik pola aliran yang terbentuk ditangkap menggunakan *high speed camera* dan teramati pola aliran antara lain *bubbly flow, slug flow, elongated – slug flow, slug – annular flow,* dan *churn flow*. Data pola aliran tersebut dibuat ke dalam peta pola aliran dan dibandingkan dengan penelitian terdahulu. Akibat dari perubahan luas penampang menurunkan panjang *slug* dan juga kecepatan *slug* dari bagian *upstream* ke *downstream microchannel*. Karakteristik *slug* berupa panjang *slug* dan kecepatan *slug* lebih pendek dan lebih tinggi pada fluida *non-Newtonian* CMC 0,4%.

Kata kunci : Aliran Dua Fasa, Microchannel, Non-*Newtonian*, Perubahan Luas Penampang, Ekspansi, Pola Aliran, Karakteristik *Slug*, *Pressure Drop*

ABSTRACT

Experimental studies on the two-phase flow of non-Newtonian fluids were carried out on flow pattern characteristics and pressure drop in microchannels with square cross-section with sudden expansion. Rectangular cross section of microchannel has D_H= 0.8 mm in the upstream and D_H= 0.5 mm in the downstream. Variations in superficial liquid velocity has a range of j_L= 0.1 – 1 m/s and the superficial gas velocity (j_G) has a range of j_G= 0.67 – 20 m/s. The microchannel has six pressure taps that are connected to the DPT (Differential Pressure Transducer) to measure the pressure drop. Additionally, the Newtonian two-phase flow with water - Nitrogen is used as a reference. The non-Newtonian fluid, CMC 0.4%, shows a higher pressure drop compared to the Newtonian fluid, water. The pressure drop phenomenon is significantly influenced by the cross-sectional area change for both Newtonian and non-Newtonian fluids.Flow pattern characteristics are captured using a high-speed camera, revealing flow patterns including bubbly flow, slug flow, elongated-slug flow, slug-annular flow, and churn flow. These flow pattern data are charted into flow pattern regime maps and compared with previous research. Cross-sectional with expansion area results in a reduction in slug length and slug velocity from the upstream to downstream microchannel. The characteristics of the slug with non-Newtonian fluid CMC 0.4% are shorter slug length and higher slug velocity than Newtonian fluid Aquadest.

Keywords : *Two-Phase Flow, Microchannel, Non-Newtonian, Change of Area, Expansion, Flow Pattern, Slug Characteristics, Pressure Drop*