INTISARI

Salah satu pola aliran dua fase yang perlu diperhatikan adalah pola aliran *slug*. Pada berbagai aplikasi industri, pola aliran *slug* sebisa mungkin dihindari karena frekuensi pola aliran ini dapat beresonansi dengan struktur perpipaan dan menyebabkan kerusakan parah. Selain itu, gesekan antara *slug* dengan dinding bagian bawah dan bagian atas pipa atau gesekan antara dua fase fluida menimbulkan beda tekanan (*pressure* drop). Melihat pentingnya pengetahuan yang mendalam mengenai aliran *slug* maka perlu dilakukan penelitian lebih lanjut.

Penelitian ini dilakukan pada pipa *acrylic* transparan *horizontal* berdiameter 16 mm dengan variasi kecepatan superfisial udara antara 0,7-8 m/s dan kecepatan superfisial air antara 0,2-1,13 m/s. Metode visualisasi digunakan untuk mengetahui karakteristik visual *sub-regime* aliran *slug.* Selain itu digunakan juga metode CECM untuk mengetahui nilai *liquid hold-up* ketika terjadi *slug* dan *pressure transducer* untuk mengetahui nilai beda tekanan.

Empat *sub-regime* aliran *slug* diidentifikasi berdasarkan pengamatan visual. *Sub-regime* aliran *slug* tersebut antara lain: aliran *less aerated slug,* aliran *slug and plug,* aliran *highly aerated slug,* dan aliran *slug and wavy.* Nilai rata-rata beda tekanan maksimum mendominasi aliran *highly aerated slug,* sedangkan nilai rata-rata beda tekanan minimum mendominasi aliran *slug and plug*. Nilai rata-rata *liquid hold-up* pada aliran *slug and plug* mendekati 1 dan terus menurun seiring bertambahnya kecepatan superfisial udara.

Kata kunci: aliran dua fase, air-udara, *slug, sub-regime*, visualisasi, tekanan statik, beda tekanan, *liquid hold-up*, peta pola aliran.

ABSTRACT

One of the most important flow patterns of two-phase flow is slug. In various industrial applications, slug flow should be avoided as it causes structural damage due to the mechanical vibration. Friction among the fluid and pipe wall or between two phase fluids causes pressure drop. Knowing how important knowledge about slug flow, various researches need to be conducted to find a deep understanding of slug flow studies.

This research is conducted using transparent horizontal acrylic pipe with diameter 16 mm with a variation on the superficial velocity of gas between 0,7-8 m/s and superficial velocity of water between 0,2-1,13 m/s. Visualization method is used to determine visual characteristics of sub-regime slug flow. In addition, to determine the magnitude of slug liquid hold-up, CECM method is also used. Meanwhile, the magnitude of pressure drop is measured using pressure transducer.

Four distinct slug flow sub-regimes are identified based on the visual observations. These slug flow sub-regimes are; less aerated slug flow, slug and plug flow, highly aerated slug flow, and slug and wavy flow. Maximum and minimum average value of pressure drop are observed in highly aerated slug zone and slug and plug zone, respectively. Average value of liquid hold-up in slug and plug zone are almost 1 and continue decreased along with increasing superfisial velocity of air.

Keywords: two phase flow, water-air, slug, sub-regime, visualization, static pressure, pressure drop, liquid hold-up, flow pattern map