INTISARI

Tujuan penelitian ini ialah untuk mempelajari pengaruh densitas cairan, viskositas cairan, dan densitas gas terhadap karakteristik *counter-current flow limitation* atau flooding pada pipa horizontal. Analisis numerik dilakukan menggunakan *softwar*e CFD Ansys Fluent 2020 R2 *student version* dengan menerapkan model *volume of fluid* (VOF). Aparatus penelitian yang digunakan ialah geometri pipa *hot leg* reaktor PWR tipe German Konvoi skala 1/30 yang terdiri dari *reactor pressure vessel*, pipa *hot leg*, dan *steam generator*. Pipa *hot leg* yang digunakan memiliki diameter dalam D = 25,4 mm dan panjang pipa horizontal L = 635 mm (L/D = 25). Cairan yang digunakan ialah air, kloroform, larutan gliserin 10%, dan propil asetat, sedangkan gas yang digunakan ialah udara dan uap air. Hasil penelitian menunjukkan bahwa peningkatan densitas cairan menyebabkan peningkatan kecepatan *superficial flooding* gas, serta menyebabkan pergeseran *hydraulic jump* dan *locus of slugging* menjauhi belokan. Hasil dari peningkatan viskositas cairan menunjukkan pola yang berkebalikan dibandingkan hasil dari peningkatan densitas cairan. Penurunan densitas gas menyebabkan *flooding* terjadi pada kecepatan *superficial* gas yang lebih tinggi, serta menyebabkan pergeseran *hydraulic jump* dan *locus of slugging* menjauhi belokan.

Kata kunci: *Counter-current flow limitation*, sifat fisis fluida, *computational fluid dynamics*

ABSTRACT

The purpose of this research was to study the effect of liquid density, liquid viscosity, and gas density on the characteristics of counter-current flow limitation or flooding in horizontal pipes. Numerical analysis was carried out using Ansys Fluent 2020 R2 student version by applying the volume of fluid (VOF) model. The geometry used in this research was the hot leg pipe of a 1/30 scale of German *Konvoi* PWR which consisted of a reactor pressure vessel, a hot leg pipe, and a steam generator. The hot leg pipe used had an inner diameter of D = 25.4 mm and a horizontal pipe length of L = 635 mm (L/D = 25). Liquids used were water, chloroform, 10% glycerine solution, and propyl acetate, while gases used were air and water vapor. The results showed that an increase in liquid density caused an increase in gas superficial flooding velocity, and caused a shift in hydraulic jump and locus of slugging away from hot leg bend. The result of the increase of liquid viscosity showed the opposite pattern to the increase of liquid density. The decrease in gas density caused flooding to occur at higher superficial gas velocities, and causes a shift in the hydraulic jump and locus of slugging away from hot leg bend.

Keywords: Counter-current flow limitation, fluid properties, computational fluid dynamics