INTISARI

Salah satu contoh fenomena aliran dua fase ditemukan pada *Pressurized Water Reactor* (PWR) pada reaktor nuklir. Bila terjadi kebocoran, pada bagian saluran primer *hotleg* terdapat cairan pendingin (*coolant*) dan uap panas (*hot steam*) yang berasal dari reaktor mengalir secara berlawanan arah (*counter-current*).

Dalam penelitian ini telah didapatkan pengaruh fenomena flooding terhadap perbedaan tekanan. Penelitian dilakukan dalam pipa kompleks transparan dari akrilik sebagai simulator *hotleg* yang terdiri tiga bagian: pipa horizontal, belokan dan pipa miring. Ukuran geometri pipa dengan skala 1:30 dari pipa lengan panas (*hotleg*) pada sistem PWR, dengan diameter dalam D = 25.4 mm panjang pipa horisontal L = 635 mm, belokan, dan panjang pipa miring 20 mm dengan inklinasi 50^o. Digunakan fluida berupa air dan udara. Pengukuran perbedaan tekanan dilakukan dengan memasang sensor *differential pressure* pada bagian *lower tank* (simulator RPV) dan *upper tank* (simulator SG) yang dihubungkan dengan akusisi data agar dapat di komputasi. Perbedaan tekanan diamati pada sebelum, saat dan sesudah terjadi *flooding*. Pengukuran perbedaan tekanan yang dilakukan dengan perubahan variasi kecepatan antara air dan udara, diteliti bagaimana karakteristik dan pola alirannya.

Untuk aliran strata perbedaan tekanan naik dengan perlahan seiring kecepatan superfisial udara dinaikkan. Pada aliran *wavy*, *slope* perbedaan tekanan lebih tinggi daripada aliran strata. Saat *onset of flooding* yang ditandai terbentuknya *slug,* kenaikan perbedaan tekanan sangat tinggi. Hasil penelitian ini juga dibandingkan dengan beberapa korelasi yang menggunakan parameter kecepatan superfisial tak berdimensi dengan korelasi Wallis. Bisa dituliskan seperti pada korelasi Wallis yaitu $J_G^{*\frac{1}{2}} + 0{,}3945\, J_L^{*\frac{1}{2}} = 0{,}5589$.

Kata kunci: Aliran Dua Fase, Aliran Berlawanan Arah, *Pressurized Water Reactor,* Pola Aliran, Mekanisme *flooding, Slug, Onset of Flooding,* Perbedaan Tekanan

ABSTRACT

One application of a two-phase flow phenomenon is found in a Pressurized Water Reactor (PWR) in a nuclear reactor. If there is a leakage, the hotleg, part of the primary channel, contains coolant and hot steam from the reactor flowing counter-currently.

In this research, the influence of flooding phenomenon on pressure drop has been obtained. The research was carried out in a transparent complex pipe from acrylic as a simulator hotleg consisting of three parts: horizontal pipe, bend and inclined pipe. Pipe geometry is scaled down 1:30 from the hotleg pipe in the PWR system, with an inside diameter D = 25.4 mm horizontal pipe length L = 635 mm, bend, and inclined pipe length 20 mm with an inclination of 50^o. Water and air are used. Measurement of pressure drop is done by installing a differential pressure sensor in the lower tank (RPV simulator) and upper tank (SG simulator) which is connected with data acquisition in order to be computable. The pressure drop is observed before, during and after flooding. Measurement of the pressure drop carried out with changes in water and air velocity variations, examined how the characteristics and flow patterns.

For stratified flow the pressure drop increase slowly as the air superficial velocity is raised. In wavy flow, slope pressure dirop is higher than stratified flow. When the onset of flooding marked by the formation of a slug, the increase in pressure drop is very high. The results of this study are also compared with some correlations that use superficial velocity non dimensional parameters by Wallis correlation. Can be written as in the Wallis correlation, $J_G^{*\frac{1}{2}} + 0{,}3945\, J_L^{*\frac{1}{2}} = 0{,}5589$

Key words: Two-Phase Flow, Counter-current Flow,Pressurized Water Reactor, Flow Pattern, Flooding Mechanism, Slug, Onset of Flooding, Pressure drop