

## ABSTRACT

Two phase flow has been used in so many industrial processes, such as boilers, reactors, heat exchanges, geothermal and others, some parameters that need to be studied include flow patterns, hollow fractions and pressure changes. research on hollow fractions aims to determine the composition of the gas and liquid phases that occur. the phase composition that occurs in the two-phase flow will effect the nature and value of the flow property, knowing the property value of each phase that occurs can be known so that it can facilitate further analysis. The purpose of this study is to find out the characteristics of the hollow fraction of various patterns that appear, to determine the characteristics of the speed, length and frequency of bubbly and plug.

This research was carried out in 4 stages (on the basis of working fluid), namely: air-water, air-water + 0% glycerin, air + water 10% glycerin, air-water + 20% glycerin, and air-water + 30% glycerin, research conducted to determine the empty fraction one of them by using the method of digital image processing by using the MATLAB R2014a software

The results of the study it was found that the flow patterns that emerged in this study were bubbly, plug, annular, slug-annular and churn flows. the results of the study show that the hollow fraction value is determined by the superficial velocity of the liquid and air velocity. the greater the superficial velocity of air, the lower the fraction value will decrease. the value of the hollow fraction of the bubbly flow pattern will increase significantly over a period of time caused by the emergence of plugs. in the flow pattern the hollow fraction plug will reach 1 at a certain time range. this is because the plug meets the test section section of the channel. the bubbly and plug flow patterns are greatly influenced by the viscosity of the fluid. This is because the higher the viscosity of the fluid, the faster the speed of the bubbly and plug flow patterns, the lower the viscosity, the faster the speed of the bubbly and plug flow patterns. the length of the bubbly pattern and the plug are influenced by the higher homogeneous value, the length of the pattern increases. on the frequency of bubbly and plug appearances, the frequency is quite high, which results in an increase in the value of the empty fraction.

**Keywords :** multiphase, void fraction, flow pattern, viscosity, digital image processing