NUMERICAL MODELLING ON THE EFFECT OF NUMBER OF CURVATURE TO THE VELOCITY PROFILE IN ASYMMETRIC CURVE CHANNEL

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“I declared that this is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree. “

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ABSTRACT

In the realm of microfluidics technology there have been very much development work devoted to bring the lab-based device to the real device for end-user application. The hydrodynamic flow focusing as can been in commercial flow cytometry utilizes numerous channel configuration which required three inlet and one outlet for Y-channel. This configuration contributes to the complexity in the design and requires additional liquid driving systems to generate the fluid flow. This work will leverage the inertia flow principle with aims to assist particles to flow into one-by-one fashioned at the outlet channel. In order to understand the fluid physics in the channel specifically the formation of the secondary flow, a numerical simulations has been performed on microfluidic channel featuring several sets of asymmetric curves. This work analyzes the initiation of secondary flow in the channel comprising different number of curvatures. Using ANSYS Software, the microchannel will be designed and tested by using two volume flow rates, 10µL and 50µL. The velocity profile for each of curvatures has been determined in the numerical simulations. At 50µL of volume of flow rate and curve 6 position, the Dean Number is 7.588 which is good enough for the performance of the secondary flow. The addition of number of curvatures and larger value of volume flow rate produce the stable form of secondary flow.