

## NUMERICAL MODELLING ON THE EFFECTS OF FLOW RATES TO THE VELOCITY PROFILES IN SERPENTINE MICROFLUIDIC STRUCTURE

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BACHELOR OF MECHANICAL ENGINEERING
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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."

Signed: .....

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"I declared that I read that	is thesis and in	our point of view this thesis is qualified in
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#### **ABSTRACT**

In this modern era, the development of microfluidic technology applies itself to getting the laboratory-based device into the real environment for end-user applications. Flow focusing as can be seen in the application of flow cytometry is achievable through hydrodynamic flow, dielectrophiresis or using inertia force. This work leverages the effect of inertia force in curved microchannel to assist the generation of flow focusing. The fundamental issues in inertia focusing is to identify the flow velocity (represents the flow rates) to initiate the secondary flow formation in the channel. The main objective of this project is to study the effect on+ the velocity profile in the microchannel at different flow rates and the formation of the secondary flow in the channel. The research will be performed with a microfluidic channel configuration consisting of 5 curvatures with a tipping angle of 20°. ANSYS Fluent software will be used to construct the design and tested by using four volume flow rates which are 10 µL/min, 50 µL/min, 100 µL/min and 200 µL/min. ANSYS fluent can generate the result of streamline, vector and contour. From the result, the scalar velocity from each cross-section in the channel will generate a velocity flow profile and Dean Vertices. At Q 50 µL/min, Secondary flow already occur at Dean number = 5.62. Increasing the volume flow rate will have an impact on the performance and stability of secondary flow.