Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Study on the Control of Bio-Fluid in the Microfluidic Channels Using Numerical Analysis and Computer Programming AARON ZHAO, Harvard-Westlake School, RICHARD KYUNG, Choice Research Group — With the assistance of microfluidic technology, the integrated organ-on-a-chip (OOC) system can be miniaturized. In this paper, we aim to optimize microfluidic technologies through a multiple channel network using numerical and computer programming. This paper was to evaluate the micro-fluid flow in organ-on-a-chip microfluidic systems considering factors such as flow pattern, optimal flow rate, and flow uniformity. For the purpose of this paper, microfluidic channels with a circular cross section were chosen for computational and numerical simulations due to their low fabrication complexity. Computer code was developed to investigate how the flow rate would change based on a variety of factors through both an iteration analysis. For this research, continuity equation, modified Bernoulli equation, and the Hardy-Cross method which is an alternate iterative method were used. For the one dimensional and two dimensional sample structures of microfluidic channels, geometrical factors such as sample size and fluid properties were considered. Ultimately, the results showed that flow rate had a quadratic relationship to length and diameter of the channel in the iterative methods.

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Date submitted: 13 Sep 2019 Electronic form version 1.4