

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Flow physics of single-phase laminar flow through diamond microchannel SANDEEP GOLI, SANDIP KUMAR SAHA, AMIT AGRAWAL, Indian Institute of Technology, Bombay — Diamond microchannel is a varying cross-section microchannel with diverging and converging flow passages. Flow in such devices has significance in the design of micromixers, micropumps and microreactors. Three-dimensional numerical analysis of single-phase laminar liquid flow has been performed to understand the effect of the given configuration on flow parameters such as pressure drop and Poiseuille number. The results show that pressure drop in given configuration are consistent with theoretical predictions, which suggests that existing correlations for uniform microchannels can be applied to the present configuration. Towards this, an appropriate length scale has been identified to make the hydrodynamic flow resistance of the diamond microchannel is same as that of an equivalent uniform microchannel. This is located at 1/7th of the total length of the microchannel from its inlet. This location makes the hydrodynamic resistance of microchannel independent of its geometric and flow parameters. In addition, flow physics has been studied with the help of velocity, pressure and shear stress profiles.

Sandeep Goli
Indian Institute of Technology, Bombay

Date submitted: 01 Aug 2019

Electronic form version 1.4