Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Experimental evaluation of thermal transport in partially-porous channel flow SHILPA VIJAY, MITUL LUHAR, University of Southern California — While convective heat transfer in channels completely filled with metal foams has been studied extensively, heat transfer in channels that are partially filled with porous foams is less well understood. Previous direct numerical simulations for partially porous channel flow indicate that large vortex structures enhance turbulent heat transfer at the porous medium-unobstructed flow interface. This project aims to experimentally investigate this interfacial thermal transport. The experimental setup involves commercially-available Aluminum foams attached to a heater block and placed in a forced convection arrangement adjacent to an unobstructed channel of equal height. Pressure drop and temperature measurements have been made across the porous section for bulk Reynolds number ranging from 800-3500. Particle Image Velocimetry (PIV) measurements made at a subset of these Reynolds numbers confirm the emergence of interfacial vortex structures in certain conditions. Currently, heat transfer performance in this system is evaluated via estimates of the Nusselt number and friction factor. Ultimately, the PIV dataset will be used to quantify the effect of the interfacial turbulent flow on thermal transport

Shilpa Vijay
University of Southern California

Date submitted: 31 Jul 2019 Electronic form version 1.4