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Interfacial thermal transport in partially porous channel flow at turbulent flow regimes SHILPA VIJAY, MITUL LUHAR, University of Southern California — We investigate interfacial thermal transport in a partially porous channel via laboratory experiments to evaluate the effect of porous medium microstructure at varying Reynolds numbers. 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. Commercially-available Aluminum foams with nominal pore sizes 10 ppi and 40 ppi are attached to a heater block and placed in a forced convection arrangement adjacent to an unobstructed channel. Measurements of pressure drop and temperatures are made across the porous section for bulk Reynolds number varying from 500 to 1500 to characterize friction factors and Nusselt numbers. Heat transfer efficiency with respect to pumping power requirements is evaluated. Particle Image Velocimetry (PIV) measurements made at a subset of these Reynolds numbers are being analyzed to test for the emergence of interfacial vortex structures, and quantify their effect on interfacial thermal transport.

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