Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Dilute suspensions over and through porous structures; the impact of permeability and porous thickness[1] THERESA WILKIE, EILEEN HAFFNER, PARISA MIRBOD, University of Illinois at Chicago — Suspension flows at various concentrations have been studied significantly within impermeable/smooth channels. Likewise, porous media has been studied in various engineering applications including carbon nanotube forests applications. However, there are few studies in terms of the coupling between these two flows. This study examines a pressure-driven, dilute suspension flow in a channel where the bottom wall replaced by porous media. The properties of the porous media were manipulated to see how they change the velocity profiles and parameters at the suspension-porous interface. A dilute, non-Brownian, neutrally-buoyant suspension of rigid spherical particles with 3% bulk volume fraction was passing over rigid porous media consisting of cylindrical rods perpendicular to the flow direction. It was observed that as the permeability of porous media increases the location of the maximum velocity within the free-flow region shifts towards the interface. Properties at the interface such as, the dimensionless slip parameter, slip length, slip coefficient, and penetration depth are all greatly affected by the porous media thickness and permeability.

[1]National Science Foundation award 1854376

Eileen Haffner
University of Illinois at Chicago

Date submitted: 03 Aug 2020 Electronic form version 1.4