Abstract Submitted
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Experimental and numerical studies of particle-laden fluid flows over a porous media model[1] EILEEN HAFFNER, CHANGWOO KANG, University of Illinois at Chicago, NINA SHAPLEY, Rutgers University, The State University of New Jersey, PARISA MIRBOD, University of Illinois at Chicago — Suspension flows has been extensively studied through various experimental techniques and numerical simulations but only in smooth channels. On the other hand, flow of pure Newtonian fluid over porous media has been the topic of several investigations. However, to the best of the author's knowledge, how these two engineering systems relate to one another is still unknown. This study was conducted to examine the interaction between various suspensions over a porous media model. Two experimental techniques were utilized, particle image velocimetry (PIV) and nuclear magnetic resonance (NMR) imaging. The PIV data provided two dimensional velocity vector fields which was used to extract slip velocity and shear rate at the interface between the free flow region and the porous media for dilute suspension flows. The NMR measurements provided three-dimensional velocity and concentration information through and above the porous media for higher concentrated suspensions. It was found that the slip velocity, shear rate, and concentration profiles are strongly dependent on the suspension concentrations as well as the geometry and properties of the porous media. Theoretical simulations were developed and compared to the experimental results, showing good agreement in the free flow region.

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