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Turbulent Channel Flow of Suspensions over Porous Media.[1] SEYEDMEHDI ABTAHI, The University of Illinois at Chicago, Chicago, USA , MARCO E. ROSTI, Complex Fluids and Flows Unit, Okinawa Institute of Science and Technology Graduate University, 1919-1 Tancha, Onna-son, Okinawa 904-0495, Japan, LUCA BRANDT, Linne Flow Centre and SeRC, Department of Engineering Mechanics, KTH, Stockholm, Sweden , PARISA MIRBOD, The University of Illinois at Chicago, Chicago, USA — In this study, we discuss the flow of turbulent suspension of non-Brownian and non-colloidal, rigid spherical particles in a Newtonian fluid over a porous wall. We consider suspension flows where the volume fraction ranges changes from 0 to 0.2 with different wall porous permeability, while porosity is constant at 0.6. Direct numerical simulations (DNS) with an immersed boundary method (IBM) are employed to resolve the particles and flow phase and coupled with the volume-averaged Navier-Stokes (VANS) to solve the flow within the porous layer. The results show that the mean velocity profiles are significantly altered by the presence of the particles in the fluid region when increasing the permeability of the porous layer. At the highest volume fraction investigated here, 0.2, the velocity fluctuation intensities and the Reynolds shear stress are found to decrease. The overall drag is found to grow with the volume fraction.

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seyedmehdi abtahi
University of Illinois at Chicago

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