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Pore-Scale Investigation of Clustering of Inertial Particles in Turbulent Flow Through a Porous Medium[1] SOURABH APTE, Oregon State University, Corvallis, OR, USA, THIBAULT OUJIA, Aix-Marseille University, CNRS, I2M, Marseille, France, XIAOLIANG HE, Pacific Northwest National Laboratory, Richland, WA, USA, BENJAMIN KADOCH, Aix-Marseille University, CNRS, IUSTI, Marseille, France, KEIGO MATSUDA, Japan Agency for Marine-Earth Science and Technology, Kanagawa, Japan, KAI SCHNEIDER, Aix-Marseille University, CNRS, I2M, Marseille, France — Transport and deposition of fine inertial particles in porous media is of interest in several applications such as spillage of contaminants in stream or river beds, water filtration systems, enhanced oil recovery, among others. Specifically, sweep and ejection patterns and turbulence within the porous bed in the sediment-water interface region of stream or rivers may influence the trapping and deposition of fine inertial particles in the bed. In the present work, we use direct numerical simulation to investigate effect of turbulent flow in the confined geometry of a face centered cubic porous unit cell on the transport of fine particles at different Stokes numbers ($St_p = 1, 0.1, 0$) and at a pore Reynolds number of 500. Particles are advanced using one-way coupling and collision of particles with pore walls is modeled as perfectly inelastic, damping the particle velocity. The pattern of clustering is investigated using multiscale wavelet analysis and area of Voronoi tessellation cells. The results are compared with preferential concentration in forced isotropic turbulence to investigate the effect of geometric confinement on particle clustering.

[1]Visiting Scientist, Aix-Marseille University, CNRS, I2M, Marseille, France

Sourabh Apte
Oregon State University

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