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Title: Spatial velocity fluctuations in flow through porous media

SOROUSH ARAMIDEH, TIANQI GUO, PAVLOS P. VLACHOS, AREZOO M. ARDEKANI, Purdue Univ — Understanding the flow in porous media is of great importance and has direct impact on many processes in chemical and oil industries, fuel cell design, and filtration. In this work, we use direct numerical simulations (DNS) to examine the flow through variety of sphere packings with different levels of complexity and heterogeneity. DNS results are validated with velocity fields obtained via volumetric particle tracking velocimetry at high resolution. We show that flow in random close packing of spheres has unique statistical properties while the medium is random itself. Furthermore, we quantify the relationship between pore geometry and velocity fluctuations.

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