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Permeability modification in 3D porous media due to polymer retention SHIMA PARSA, School of Engineering and Applied Sciences, Harvard University, HUBERT SIZARET, ESPCI ParisTech, PSL Research University, DAVID WEITZ, School of Engineering and Applied Sciences, Harvard University
— We combine confocal microscopy and bulk transport measurements to quantify the changes in the permeability of a model porous media after flow of a polymer solution. The 3D micromodel is made of closely packed glass beads with diameter of 150 micrometers. By matching the index of refraction of the fluid with beads we are able to measure the fluid velocities at pore level deep in the medium using particle image velocimetry. Our measurement shows that the medium permeability decreases 60% after flow of multiple pore volumes of polymer solution and then flushing with water. At constant flow rate we estimate that the pore velocity increases almost 23% due to this reduction in permeability. Our microscopic measurements of the velocities in pores shows that the average velocity increases considerably more than estimated bulk value. Also the distribution of velocities has a slower decay indicating somewhat higher probability of large velocities in the medium after retention of polymer. These changes in velocities are not uniform and depends on the pore size.

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