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Investigation and visualization of flow through porous media at the pore scale SOPHIE ROMAN[1], CYPRIEN SOULAINE, ANTHONY KOVSCEK, Stanford Univ, DEPARTMENT OF ENERGY RESOURCES ENGINEERING TEAM — In this work, a micro-Particle Image Velocimetry (micro-PIV) system is used to quantitatively investigate the dynamics of fluid displacement in simplified porous media. The porous media under study are 2D etched micromodels containing a flow pattern either composed of circular grains homogeneously distributed or made of a sandstone replica pattern. The fluid is seeded with microparticles which are used to estimate the velocity field with PIV algorithms. The exact pore-scale velocity profiles are obtained in the case of a fully saturated porous medium with a typical pore size of 5-40μm. The experimental velocity measurements are compared with 2D direct numerical simulations of the flow through the two different geometries under consideration. We have shown that the micro-PIV measurements have produced results in very good agreement with the numerical simulations for single-phase flows. Therefore, this experimental technique can be used with confidence to investigate flow properties in porous media. In particular this technique can be powerful for the study of immiscible two-phase flow in porous media in a wide range of parameters, for which numerical tools are still in development and need reliable data to be validated.

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