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Micro-PIV measurements of multiphase flow of water and liquid CO_2 in 2D homogeneous and heterogeneous porous micromodels YAOFA LI, FARZAN KAZEMIFAR, GIANLUCA BLOIS, KENNETH CHRISTENSEN, University of Notre Dame — Geological sequestration of carbon dioxide (CO_2) has been of great interest primarily for the reason of CO_2 emission reduction and enhanced oil recovery. Yet, our fundamental understanding of the coupled flow dynamics of CO_2 and water in geologic media still remains limited, especially at the pore scale. Therefore, in this work the pore-scale flow of water and liquid/supercritical CO_2 are quantified in 2D homogeneous and heterogeneous porous micro-models under reservoir-relevant conditions. Fluorescent microscopy and the micro-PIV technique are employed to simultaneously visualize both phases and obtain the velocity field in the aqueous phase. The velocity measurements in the homogeneous micro-model illustrate active and passive flow pathways and circulation regions near the fluid-fluid interfaces induced by shear. Moreover, the results for heterogeneous micro-models are presented and compared with those for homogeneous micro-models, which give valuable insight into flow processes at the pore scale in natural rock.

Yaofa Li
University of Notre Dame

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