



清華大學

Experimental and numerical investigations on supercritical CO₂ and brine flow in porous media

Shu Luo

Dept. of Thermal Engineering,
Tsinghua University, China

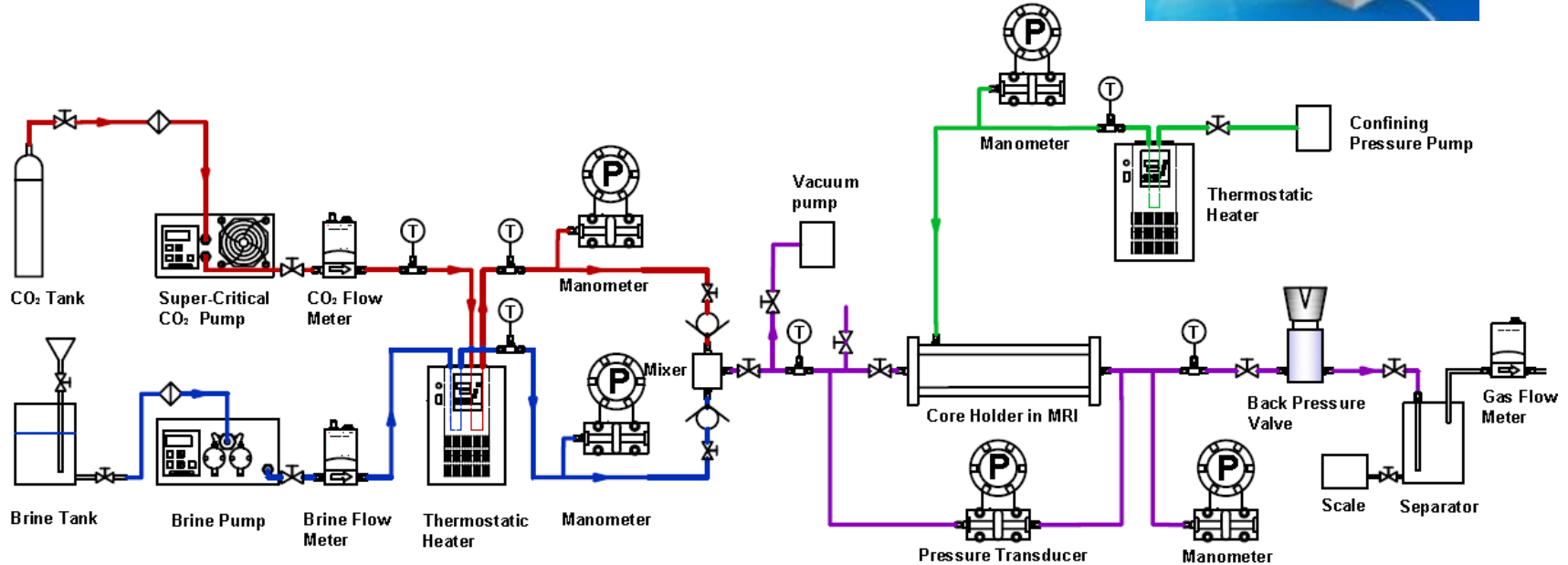
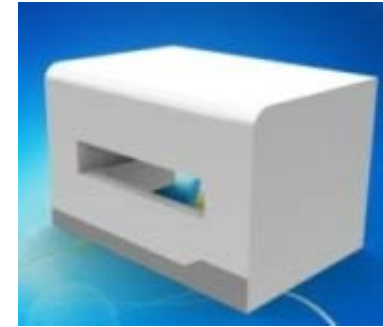
2010-09-19

Experimental system



清華大學

- ◇ Filter
- ⊗ Manual on/off valve
- ⊙ Platinum resistance
- ⊕ Check valve



Experimental result

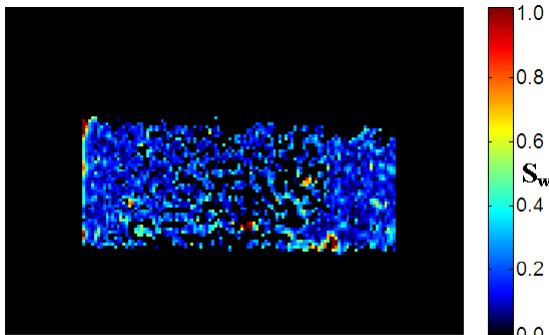


Fig. 3 Bounded water image

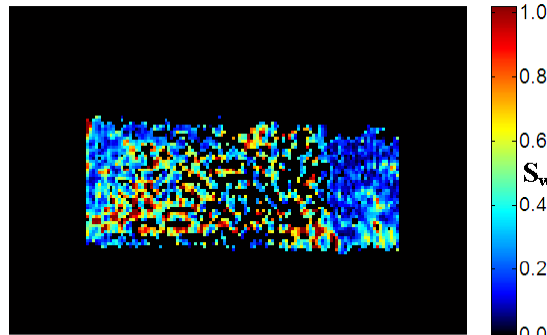


Fig. 4 water saturation image with CO₂-water ratio 3:2

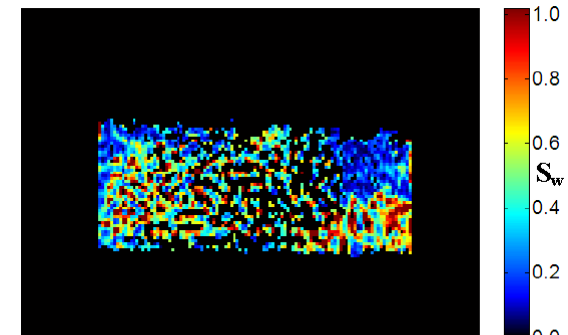


Fig. 5 water saturation image with CO₂-water ratio 1:4

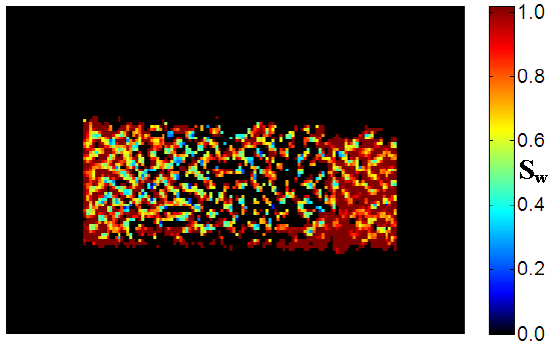


Fig. 6 water saturation image with saturated water

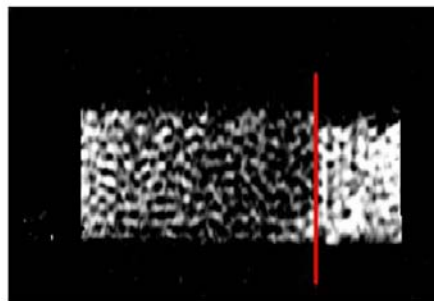


Fig. 7 Fissure defect position image

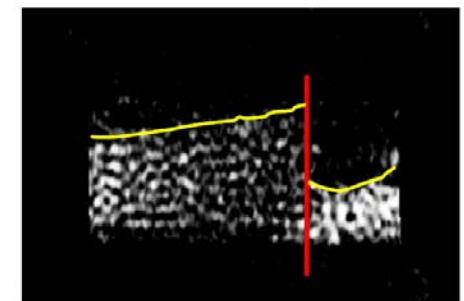


Fig. 8 Water saturation gray image with CO₂-water ratio 1:4

Numerical investigations

Pore-scale



清华大学

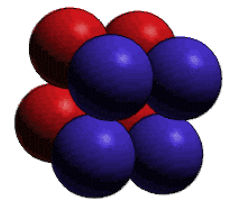


Fig. 1 Simple Cubic Arrangement

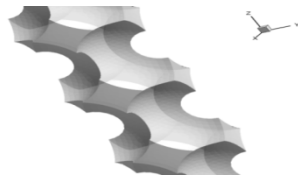


Fig. 2 The calculation model and grids for the fluid domain

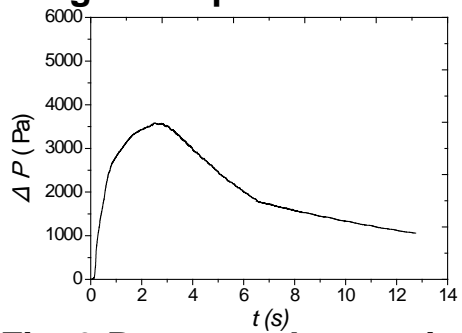
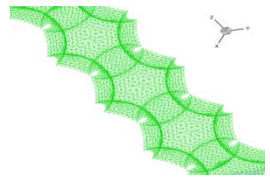


Fig. 3 Pressure drop variation with injection time

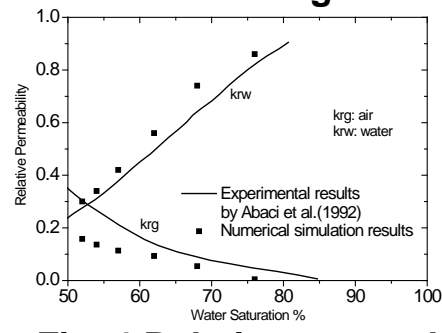


Fig. 4 Relative permeability – saturation relation of air-water

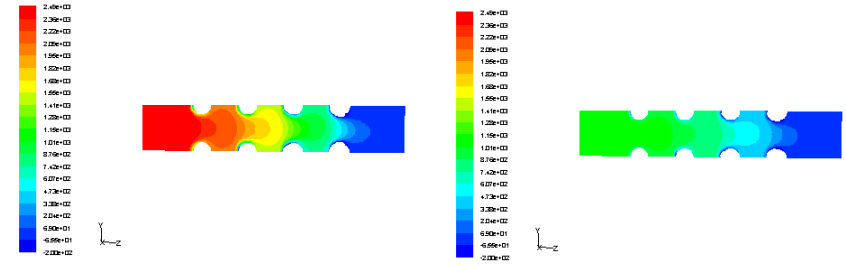


Fig. 5 Pressure distribution in centre cross section at $t=5$ s and $t=12$ s

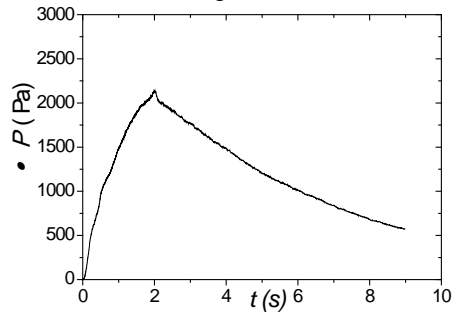


Fig. 6 Pressure drop variation with injection time

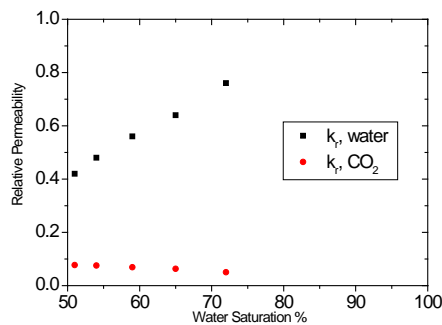


Fig. 7 Relative permeability – saturation relation of supercritical CO_2 -water

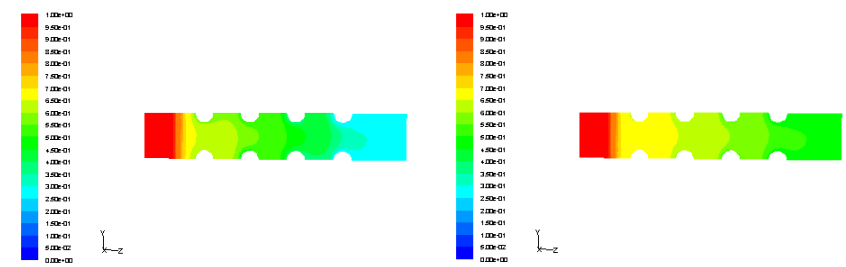


Fig. 8 Volume fraction of water in center cross section at $t=4$ s and 9 s



清華大學

Thank you!
