

Observation of Interfaces of Fluid Systems Using X-ray Microtomography

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ABSTRACT

X-ray microtomography offers unique opportunities to examine micro structural characteristics of different objects. Our microtomography system can discriminate features of objects with detectability detail from $3\mu\text{m}$. In this work we present some preliminary results of interfacial characteristics of fluids involved in core analysis and reservoir engineering problems. The objective was to develop oil sand characterization and core analysis procedures based on microtomography.

X-ray microtomography has been applied to evaluate the internal microstructure of foamed gels used in enhanced oil recovery. In this case, this technique allowed the determination of foam bubbles size distributions, the observations of changes in foamed gel texture, and the quantification of lamellae dimensions. Interfaces were also observed in different emulsions and the droplet size distribution of the emulsified phase was determined (within the limits of resolution provided by the experimental apparatus).

Liquid-liquid and liquid-gas interfaces were observed in simplified porous media consisting of large glass beads. The interfaces of water/oil, oil/gas in the pore space were visualized.

Finally, an attempt was made to visualize froth from artificially constructed oil sands. The results demonstrated that interfaces of bitumen, solids, air and water could be differentiated under controlled experimental conditions.