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ΘΕΜΑ: **Macroscopic transport parameters for multiphase flows: experiments and modeling**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΕΙΧΗΜΥΘ-ΙΤΕ

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ΠΕΡΙΛΗΨΗ

Determination of two or three-phase transport properties in porous media is of prime importance in many situations of practical interest. One major case concerns the prediction of oil or gas reservoir potentiality and production process effectiveness. Another case is the estimation of soil contamination by liquid organic pollutants and the design of remediation solutions.

Multiphase transport properties depend of course on the porous medium structure and on the fluid properties. They also highly depend on the fluid saturation and on the way the fluids are distributed within the porous medium. It is demonstrated that in order to measure representative transport properties in the laboratory we need to respect not only field pressure and temperature conditions but also the sequence and mechanisms of appearance of the fluids inside the pore structure as well as the flow parameters.

Measurement of multiphase relative permeabilities under representative conditions is a time consuming and very expensive work. Models are needed for rapid screening purposes or to extrapolate in the field scale as an input to reservoir simulators. In the work presented here tools are developed to calculate relevant transport properties for multiphase flow taking into account pore structure specificity and rock/fluids interactions. Two models are proposed and discussed: fractal models and network models. Both are based on small-scale data on the pore space geometry and topology.

Fractal models take into account structure characteristics through the fractal dimension of the pore space. Fractal dimensions are measured in the laboratory with different methods giving consistent results. The main advantage of the fractal models is that they offer analytical expressions for two and three phase relative permeabilities, easy to incorporate in a large scale simulator.

Network models are constructed in a way to respect the capillary pressure curve, the porosity and the permeability determined experimentally. The interconnectivity of the pore space is taken into account. They are more adapted than fractal models to treat residual saturations and dispersed flows. They are extended to dual-networks in order to apply to dual-porosity rocks. The dual-network incorporates information on the primary (matrix) and the secondary (vugs, fractures) porosity.

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