

Paper 2.2

3-DPTV Experiments of Anomalous, Steady Transport of a Conservative Tracer in Homogeneous and Heterogeneous Porous Media

by

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ABSTRACT

Lagrangian theories of flow and transport in porous media are largely unverified experimentally. The flow field inside a porous medium is three-dimensional so a 3D imaging technique has to be adopted to detect tracer particle movements. We present an application of the "scanning" 3-DPVT, using two cameras with optical axes orthogonal and coplanar (Fig. 1). Matched index (of refraction) porous media that are homogeneous and heterogeneous at the bench scale have been constructed and different mean flow rates applied. The reconstructed trajectories allow computing velocity distributions, mean square displacements, velocity correlation coefficients and classical dispersion tensors. Comparisons among the velocity correlation coefficient are also presented. These preliminary results show that the velocity is more correlated in the heterogeneous system than in the homogeneous ones.

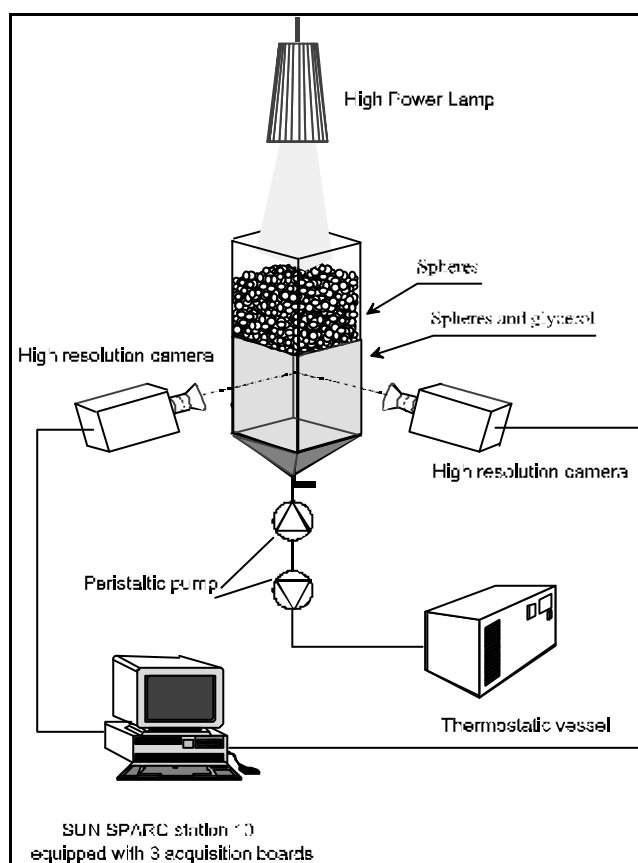


Fig. 1 Experimental set-up