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Quantification of Coupled Longitudinal and Transverse Dispersion in Porous Media

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This study uses an experimental approach to estimate the average longitudinal and transverse dispersion coefficients in a homogeneous, non-uniform, and anisotropic porous medium during miscible displacement. Traditionally, most miscible displacement studies have focused on recovery factor and recovery mechanism and the Peclet number is used to find the dispersion and diffusion coefficients from mathematical correlations. This study employs a unique method to estimate the longitudinal and transverse dispersion coefficients. A unique image processing tool is developed and used to analyze the developing mixing zone. Concentration profiles from the processed images are then used to collaborate with Bayesian estimator tool, which is developed to find the dispersion coefficients in the analytical solution of the Convection-Diffusion Equation (CDE). The results confirm that both longitudinal and transverse dispersion coefficients strongly depend on the velocity of the displacing fluid. The effects of anisotropy on miscible mass transport are investigated in this study using this unique method and longitudinal and transverse dispersion coefficients are estimated.

Participation

In-Person

References

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Energy Transition Focused Abstracts

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Session Classification: MS08

Track Classification: (MS08) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media