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## Effects of Well Arrangement on Characterization of Discrete Fracture Systems by Inverse Analysis of Tracer Tests

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Of interest in this study are the effects of well arrangement on the characterization of distributed multiple fractures through tracer tests. Numerical experiments with 1000 fracture-system realizations were conducted to simulate tracer tests for three different well arrangements: parallel, diagonal, and perpendicular with respect to the fracture orientation. Based on the numerical experiment outcomes, correlations between the representative fracture parameters (the total fracture length and the geometric mean of fracture lengths) and the characteristic parameters of the effluent tracer concentration curve were developed by using a non-parametric regression technique. The quality of the fracture parameter estimations is acceptable for the parallel and perpendicular well arrangements. However, the individual fracture-system realizations cannot be distinguished for the diagonal arrangement using representative fracture parameters; thus, the estimation quality is poor. The diagonal well arrangement should be avoided when designing tracer tests for characterizing fracture systems.

**Keywords:** [Tracer test](#), [Fracture system](#), [Inverse analysis](#), [Boundary element method](#), [Numerical simulation](#), [Fluid flow](#)

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