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A Stochastic Particle Tracking Scheme for Embedded Discrete Fracture Models[1] RANIT MONGA, Institute of Fluid Dynamics, ETH Zurich, RAJDEEP DEB, Laboratory of Physical Chemistry, ETH Zurich, DANIEL W. MEYER, PATRICK JENNY, Institute of Fluid Dynamics, ETH Zurich — In particle-based transport models for fractured media, first-order kinetic reactions, for example, can be simulated as stochastic transitions of notional particles between discrete states [1]. For particle-tracking in dual continua models, Liu et al. [2] have quantified the probabilities for particle transfer between the matrix and fractures assuming complete mixing within a grid cell. For coupled surface-subsurface set-ups, de Rooij et al. [3] have formulated a path line specific probability for transfer from a 2-D overland domain to a 3-D subsurface domain. We devise a stochastic particle-tracking scheme suited for the Embedded Discrete Fracture Model (EDFM) in a permeable matrix. Here, fractures are treated as lower dimensional manifolds [4, 5], and interfaces between the matrix and fractures are not resolved by the flow field. We formulate the probability of notional particle transfer between the interacting cells of different continua, say, from a matrix cell to a fracture cell and, also, the distribution of residence times before the transfer. The probability is specific to the associated fluid particle's trajectory in the grid cell. The scheme is mass conservative in matrix and fracture continua. Further, it can be incorporated into random walk models for dispersion.

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