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Decomposing First Passage Random Walks LAWRENCE SCHWARTZ, DAVID JOHNSON, Schlumberger, SIDNEY REDNER, Boston University — We develop a simulation method to model the time dependence of diffusion in composite materials with a wide range of pore sizes. Here, first passage techniques are useful because they allow a walker to move efficiently through the large open regions of the pore space.[1] However, because one does not keep track of each intermediate position, these techniques are not well suited to calculating the time development of the effective diffusion coefficient, D(t). To address this problem we show that first passage propagation can be decomposed in terms of a sequence of intermediate probability distributions. For example, given a first passage walk from the origin to the surface of a sphere of radius R in a time t, we can evaluate the probability distributions for the particle's location at any earlier time t′. We will illustrate the behavior of these intermediate distributions with a series of examples in one and three dimensions.

[1]Toumelin et at. J. Mag. Res. 188, 83 (2007).

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