

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Time dependent diffusion in a disordered medium with partially absorbing walls JIANG QIANG, Harvard University, PABITRA N. SEN, Schlumberger-Doll Research — We present an analytical and numerical study of time dependent diffusion coefficient in systems with partially absorbing boundary condition. We obtain a perturbative expansion for time dependent propagator in terms of volume fraction f of spheres in a dilute suspension of spheres. Exact single sphere t -operator for partially absorbing boundary condition is used to obtain a time-dependent diffusion coefficient $D(t)$ for a random distribution of spheres, accurate to the lowest order of volume fraction f . Short and long time limits of $D(t)$ are obtained and compared to the known exact results. We then present a significantly improved numerical method for dealing with random walk with partially absorbing boundary on curved surfaces. The method is applied to the dilute suspension of spheres to obtain $D(t)$ and compared with the analytical solution. Numerical simulation on a random closed packed (Finney pack) is used to study correlation between time-dependent relaxation and diffusion.

Pabitra Sen
Schlumberger-Doll Research

Date submitted: 29 Nov 2005

Electronic form version 1.4