BRANCHING WIENER PROCESS IN $I\!R^d$

P. Révész

ABSTRACT

We consider the following model:

(i) a particle starts from the position $0 \in I\!R^d$ and executes a Wiener process $W(t) \in I\!R^d$,

(ii) arriving at time $t = 1$ to the new location $W(1)$ it dies,

(iii) at death it is replaced by Z offspring where

$$\mathbf{P}\{Z = k\} = p_k \qquad k = 0, 1, 2, \ldots$$

(iv) each offspring, starting from where its ancestor dies, executes a Wiener process (from its starting point) and repeats the above given steps and so on. All Wiener processes and offspring-numbers are assumed independent of one-another.

Let

(a) $B(t)$ be the number of particles living at time t, the particles born at time t to be counted as alive at time t but not at time $t + 1$.

(b) $X_{t1}, X_{t2}, \ldots, X_{t,B(t)}$ be the locations of the particles at time t.

Our main goal is to study the properties of the array $\{X_{t1}, X_{t2}, \ldots, X_{t,B(t)}\}$ $(t = 1, 2, \ldots)$.

COVERING LARGE DOMAINS BY A WIENER PROCESS

P. Révész

ABSTRACT

Consider a simple, symmetric random walk on the lattice $\mathbb{Z}^d$. We say that the ball

$$Q(r) = \{x \in \mathbb{Z}^d,\ \|x\| \leq r\}$$

is covered by the random walk at time n if every point of $Q(r)$ is visited at least once by the random walk during its first n steps. Let $R_d(n) = R(n)$ be the largest integer for which $Q(R(n))$ is covered at time n. A typical result claims

$$\exp((\log n)^{1/2}(\log_2 n)^{-1/2-\delta}) \leq R_2(n) \leq \exp(2(\log n)^{1/2}\log_3 n) \quad \text{a.s.}$$

for all but finitely many n.