Numerical Projects

Stat Mech-2007-08, by P. K. Mohanty , Date : 26-09-07

Due date:19-11-07

1. **Random walk:** For a unbiased random walk, calculate the distribution of walkers $P(x,t)$ for two different times and show that they scale.

2. **Random walk:** For a unbiased random walk in 1-d find the distribution of first return time. Calculate the same in 2D.

3. **TASEP :** Particles enter to an one dimensional lattice (from left end) with rate α and are taken out (from right end)with rate β. Each particle then move to right ($10 \to 01$). Find density profile for $(\alpha, \beta) = (.4, .7), (.7, .4)$, and $(.7, .7)$.

4. **Directed Percolation :** Calculate survival probability $P_\infty(p)$ show that it is non-zero for $p > .70$

5. **Cellular Automata:** Simulate rule 54 and find out the correlation $\langle s_i(t) s_i(t+1) \rangle$

6. **Surface Roughness :** Take the one dimensional surface growth model $10 \to 01$ and calculate roughness $\langle (h - \bar{h})^2 \rangle$.

7. **Ising model :** Using Monte-Carlo simulation find out $s_i s_{i+k}$ for Ising model $E = -\sum s_i s_{i+1}$

8. **Random average process :** Masses m_i are placed in a one dimensional lattice. In each microscopic step, a random fraction of the mass from a arbitrary site is transfered to right. What is the distribution of masses in the steady state ?

9. **CCM Model :** Show that in CCM model, $w = \langle E(\lambda) \rangle \sim (1 - \lambda)^{-1}$ and $P(w) \sim w^{-2}$.

10. **ZRP :** Find the steady state distribution of particles $P(n)$ for

$$u(n) = 1 + 2.5/n$$

- Arindam
- Bipasha
- Debabrata
- Debarshee
- Kush
- Lab
- Mahashweta
- Mayukh
- Nazir
- Pabitra
- Asim
- Rakesh
- Raktim
- Sanhita
- Santanu
- Susmita
- Susnata
- Tanushree
- Urna
- Manjula