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ME 556

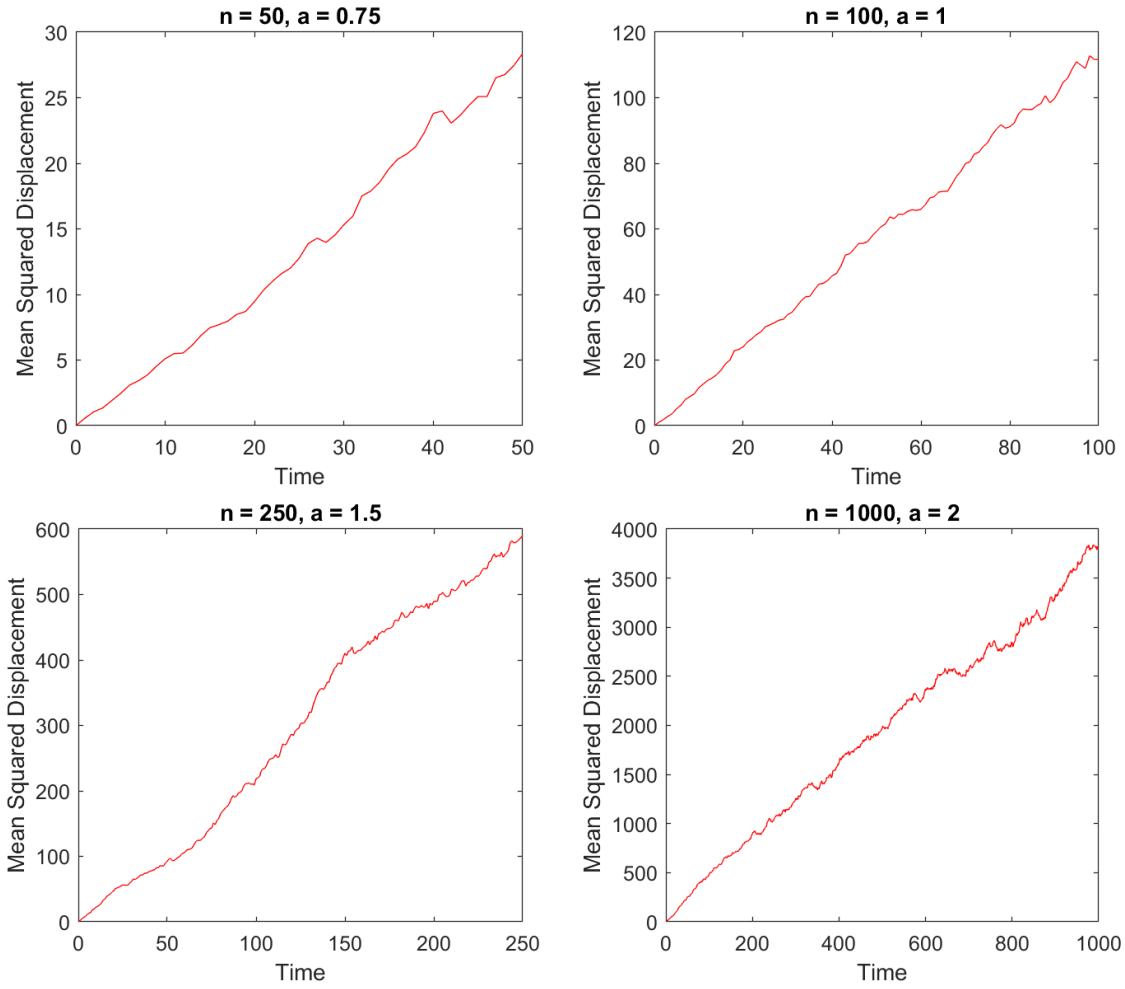
Random Walk

1. All tests passed in Matlab grader for problem 1.

2. All tests passed in Matlab grader for problem 2.

3. All tests passed in Matlab grader for problem 3.

4. The plots below prove that there is a linear relationship between the mean squared displacement and the values of the lattice constant (a) and the number of jumps (n). This linear relationship is given be equation 2.9: $\langle R_n^2 \rangle = na^2$



5. For the 2D case: $D = \frac{1}{4t}\langle R^2 \rangle$ and $D = \frac{k_{jump}a^2}{4}$ (equations 2.2 and 2.11). From these simulations it can be concluded that the diffusion coefficient also follows a linear relationship. Eq. 2.11 is only true for a random walk and the diffusion coefficient can only be determined if k_{jump} (number of jumps per unit time) is known.

6. 2000 trajectories, each with 1000 jumps, are grouped into 30 different bins with respect to their end-to-end distance, r, to show the distribution. This distribution shows that it is more common for trajectories end-to-end distance to be closer to the origin than it is for them to be farther away.