

Homework 1

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1. Refer to figure.
2. Every curve starts out with a smooth log linear increase in MSD. This is what we expect as we continue to add squared distances over time. At longer time scales, particularly at $t = 100$ seconds for $\phi = 0.8$, deviation from a linear increase is observed. During this regime, noise increases. This corresponds to a time when particles are not deviating far from their initial position. As a result, MSD is constant over time, and the particles behave less like a liquid and more like a solid. During this time, noise is generally much larger than that of the linear regime.
3. As ϕ increases, the slope of the MSD decreases. This makes sense because it is harder for particles to move around in a more tightly packed space, thus making sizable displacement harder to achieve.