A Simple Python Simulator

In classical physics, the EOM of a system can be determined from the potential in the system. Here, I will investigate a discrete particle simulation The project consists of three main python files.

- **config.py**: holds all the configuration information for the project.
- **driver.py**: computes the particle dynamics and saves them to a file.
- **visualize.py**: creates animations to view the simulations.

Physics Relationships

Looking at Potential Energy, we have:

$$\vec{\mathbf{F}} = -\nabla \mathbf{U} = \langle -\frac{\partial \mathbf{U}}{\partial x}, -\frac{\partial \mathbf{U}}{\partial y} \rangle \tag{1}$$

$$\vec{\mathbf{F}} = m\vec{\mathbf{a}} \tag{2}$$

The time derivative of velocity is acceleration so assuming that the potential energy is time independant. The change in velocity and position from $t_n \rightarrow t_{n+1}$ is:

$$\Delta\vec{\mathbf{v}} = \vec{\mathbf{a}}(t_{n+1} - t_n) \tag{3}$$

$$\Delta\vec{\mathbf{x}} = \vec{\mathbf{v}}(t_{n+1} - t_n) \tag{4}$$