**Convergence**

The order of convergence approximates the *rate* of convergence.

**How does the position of the points depend on the time step size chosen (i.e. can you observe that the position becomes more accurate (converges) if you use a finer time step size? Track the collision points for various time step sizes. Compute the distances between any two collision points for different time step sizes. Log-log plot the data.**

The position of the points clearly converges

**Can you derive the converge order of the method experimentally using the collision points?**

The error for a timestep is . The error for a more accurate simulation, using timestep , is . Combining the two results in , the right-hand side of which can be experimentally measured. Furthermore, this is equivalent to:

The largest timestep at which a collision occurs is . For every subsequent smaller timestep , the distance between the second collision point for and is plotted against the difference between and .

Fitting a curve to the data using SciPy results in experimental values of and .

