

Assignment 6

Due Wednesday October 21

1. Solve the following Physics 101 problem numerically:

Assume that you have drilled a hole through the earth and the earth has constant density. Drop a ball in the hole and calculate the motion using the Verlet algorithm.

The acceleration is simply

$$a(r) = -G4\pi/3 \rho r \tag{1}$$

where $\rho = \frac{3M}{4\pi R^3}$. Use CGS units for everything.

Solve the equations of motion using the Verlet algorithm. What is the period of oscillation of the particle?. Have the program write out (t, x, v, a) and plot these for several oscillations. Calculate how accurately energy is conserved by your program.