Physics 325 — Scientific Computing — Fall 2016 — Lab 07

October 7, 2016

Exercise 1. Jupiter Orbit

Use the Python ODEINT function to calculate the orbit of Jupiter around the sun where the sun is NOT assumed to be stationary. Use the preferred units of A.U. for distance and years for time. Remember that in these units, $GM_\circ = 4\pi^2$. Use your code to create a plot of the motion of the Jupiter where the initial (x,y) =(5.455,0.0) and (vx,vy)=(0,2.62416). (10 points)

Exercise 2. Jupiter plus Earth

Starting with the program from 1, construct a program for the 3-body problem for the Sun, Jupiter, and Earth. Start Jupiters position as in Exercise 1, and Earth should have (x,y) =(1.0,0.0) and (vx,vy)=(0,2π). Create a plot of the positions over 100 years. **(10 points)**

Extra Credit. Super-Jupiter

Repeat exercise 2 using a Jupiter mass 1000 times its current mass, make the same plot, and comment on the difference. **(5 points)**