

Project 1 - PHY607

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1 Code Content

The python script consists of two main parts. The whole project consists of analyzing a two body system. The system chosen was the earth and moon and the variables do so reflect. The first part of the project compares two numerical approximation methods for finding the trajectory of the moon about the earth: the Euler explicit method and the Runge-Kutta method to 4th order. Both methods are plotted for visual comparison. The second part of the code compares three numerical integration methods: the Reimann sum, Trapezoidal sum and Simpson sum. Again here, there are plots to compare the three methods. The integration is carried out on the kinetic, potential and total energies at each point in time to find the total quantities of each.

2 Validation

To validate, the kinetic energy plus the potential energy minus the total energy must equal zero "0". This calculation is presented when the code is run as a validation check. For the first part, the semi-major and semi-minor axes of the orbit trajectory is presented to compare with standard measurements. As a second check, each part of the project is compared to SciPy

3 Running the Code

The code is well commented to allow for changes in the variables. Since the model is based on 'real-world' variables and constants, changing one may not be enough to produce the results you want. (e.g. changing the masses or gravitational constant may significantly change the shape of the orbit)

4 ReadMe

Included with the code is a readme file to help with navigating the code.