Trip to Mars
Kernel Review

Grace Jung
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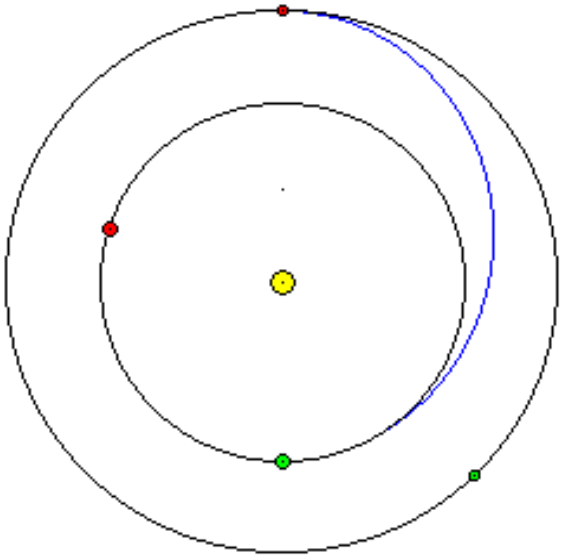
Introduction

- In hopes of future manned missions to Mars
- Hohmann transfer technique



Problem

- To model a voyage from Earth to Mars
- Calculate position and velocity of planets and rocket
- Compare planetary data to measured values
- Investigate energies

Solution

- Use Runge Kutta 4 to solve ODEs for position and velocity of bodies

$$\mathbf{F}_{12} = -\frac{Gm_1m_2}{r_{12}^3}\mathbf{r}_{12}$$

$$\frac{d\mathbf{r}}{dt} = \mathbf{v}$$

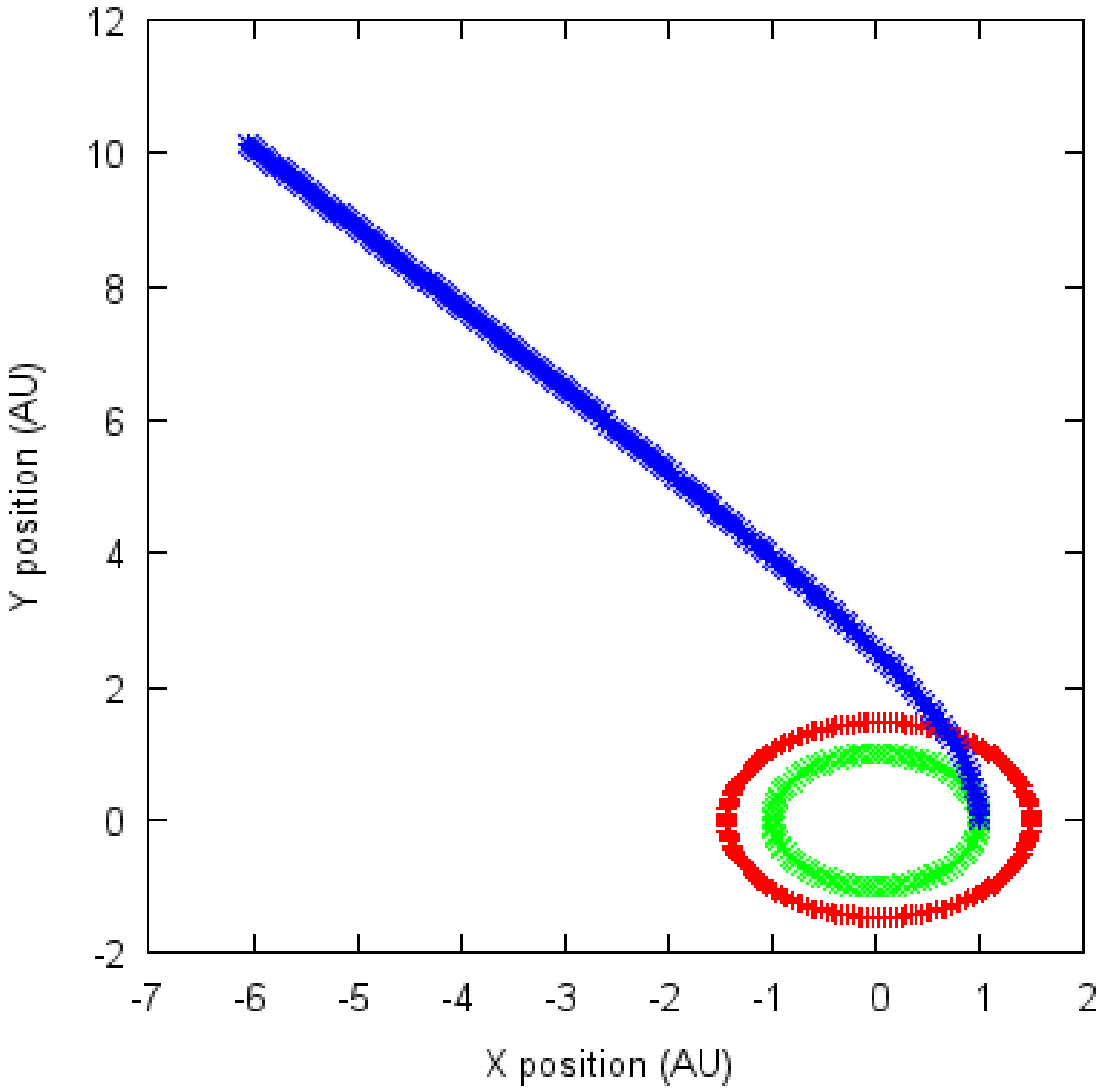
$$\frac{d\mathbf{v}}{dt} = -\frac{GM}{r^3}\mathbf{r}$$

Kernel

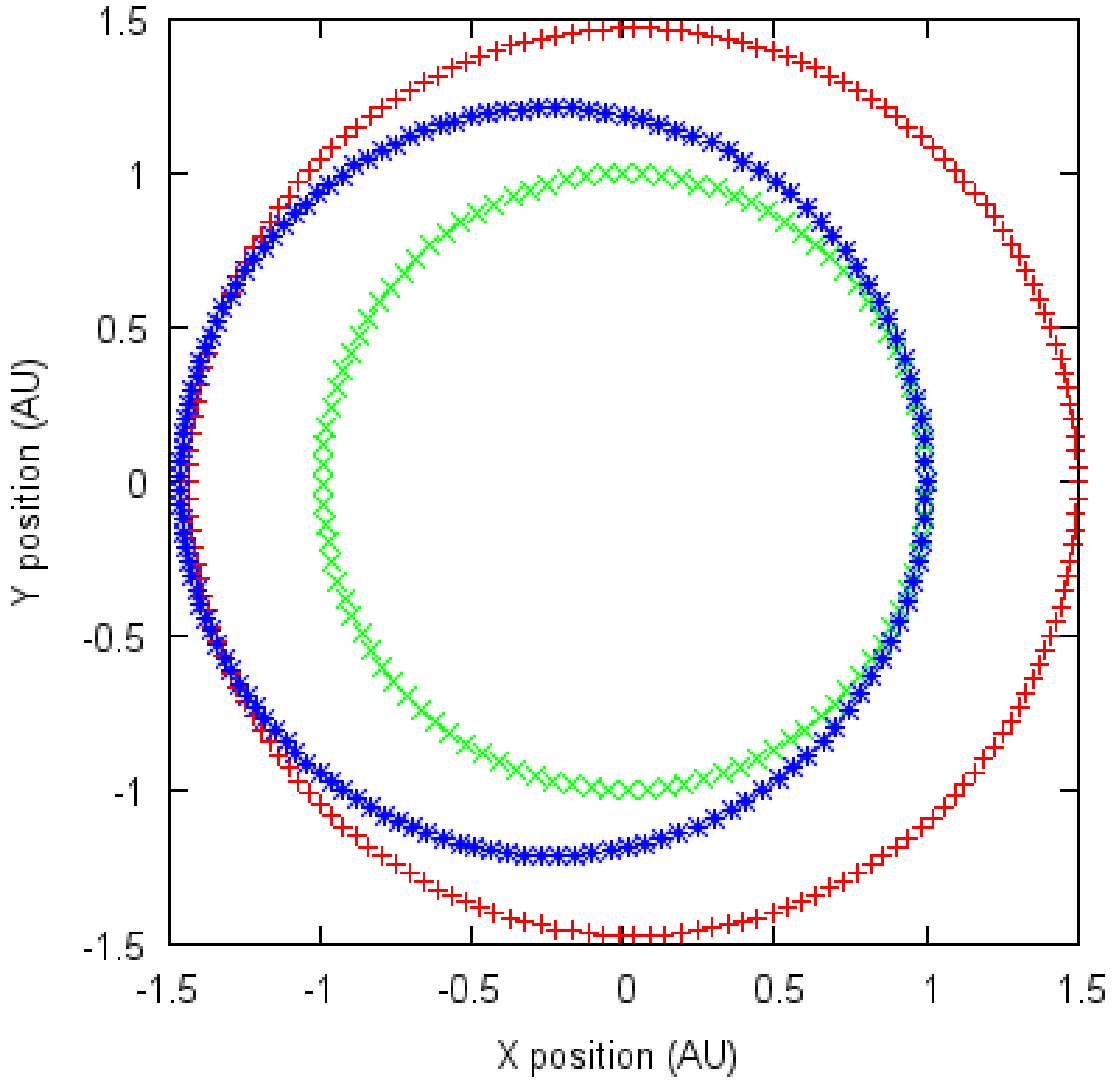
- Similar to Runge Kutta lab, only force is now gravitational
- Implement use of arrays to simplify and better organize coding
- Three functions to check that RK4 calculations: calculate k1-k4, calculates position and velocity, loops RK4 calculation and prints result

Kernel

- Initial tests show rocket flying off into oblivion



Kernel



- Given initial conditions, can get fairly accurate values and modeling

Status

- Factor in additional gravitational effects
- Realistic elliptical orbits
- Pretty animations

- And beyond?