

Team LAHS154

Alex Ionkov

Gravity assist for interstellar travel

Interim Report

Gaining speed in space can be complicated especially with fuel management. This project aims to find the best path for a satellite to exit our solar system or even galaxy. In 2013, Voyager 1 left the solar system after 36 years in space. Time is the true constraint here and this project plans to solve this. Gravity assist is a method used to gain speed or alter the path of a rocket or satellite using the gravity of a planet or other object. It is through the use of this method we plan on achieving our goal. We will make a computer model of the solar system and add a satellite function where we would take our end coordinates, outside the solar system or galaxy, and backtrack to find the means of getting there. This would be done using leapfrog integration. Thus far, we have developed a n-body model of the solar system from scratch using the brute force method. In this method, we calculate the acceleration over a time dt and multiply it by mass using Newton's second law to find force. All of this work has been done in Python using JPL Horizons data for the coordinates and velocities of the bodies. In the long term, error builds up over time because of a constant timestep (dt); one way to solve this problem is to have multiple timesteps for each planet and to have an algorithm like leapfrog to calculate these timesteps. We plan to implement leapfrog soon and begin testing.

References:

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