Preventing Mass Extinction

New Mexico

Supercomputing Challenge

Final Report

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Team 38

Las Cruces High School

Team Members

Sam Read

Brandon Bicknell

Teacher

Mrs. Cundiff

Project Mentor

Mrs. Cundiff

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Introduction

An asteroid 10 Kilometers in Diameter is hitting Earth in approximately 6 months. How do you deal with such a situation? That is what we have attempted to demonstrate to you today. In our program, we will model the orbital paths of Earth and an Asteroid to where they will collide. Then, with an input from the user, you have the ability to determine how many Kilometers a day the asteroid must be shifted for it to miss the Earth. We brainstormed multiple ideas, removed infeasible ones, and then played a game of Roulette, and we just so happened to land on this beautiful idea. It challenged us in figuring out how to make the code run, and once it did we felt humbled by how simple the code was. We both enjoy Physics and Astronomy, so this project was just right for the both of us to work on. The model simulates propulsion device that has already landed on the asteroid moving the asteroid out of the Earth's path. The model then tests to see if the device has moved the asteroid enough in 182 days.

Description and Results

Description:

In order to make a simple collision point, we shortened Earth's Year by 1 day, and we altered its orbital path from an ellipse to the average circle equivalent. The 10 Km asteroid starts at the edge of the asteroid belt and moves in an elliptical path the intercepts Earth on the 182nd day. Using a Sin function for the X coordinates and a Cos Function for the Y coordinates, it maps the position of the Earth and asteroid in respect of the time. Then the coordinates are input into an array, mapping the orbital path and comparing to find where the paths intersect. To compensate for the size of the Earth, we test to see if the asteroid is in the radius of the Earth. If so, the two collide. To move it, a change in position variable was used to as the device to change the asteroid's x position over time, otherwise that much force would simply blow up the asteroid. Depending on the amount it moves over day we can test to see if it has moved significantly enough to make the two miss each other.

Results:

We discovered that the asteroid must move a minimum of 37 Km per day (over three times its diameter) in order for it to miss the Earth by the 182nd Day. Anything below that isn't significant enough of a change to prevent the disaster, and anything above would be a waste of resources, most of which being fuel.

Conclusion

In conclusion, if the Dinosaurs had a rocket that could move an asteroid 37 Km per day, the world would be a very different place. In other words, to avoid the next mass extinction, you must have a rocket attached to the asteroid by 6 months before collision, and then have enough fuel to move it.

Recommendations

We recommend inputting new variables, such density, new sizes, and different speeds and distances as well as altering Earth's orbit back to a 365 day elliptical orbit. The asteroid's orbit should also be determined by the pull of the sun, instead of a predetermined path into Earth's orbit. The shifting of the asteroid's orbit should also be determined by force of the rocket instead of desired movement. These suggestions would provide a much more accurate model that may be a little more useful.

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