CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
S1522

Project Title
How Does the Distance between Two Super Magnets in a Magnetohydrodynamic System Affect the Overall Thrust?

Abstract

Objectives/Goals
The objective of the project was to investigate the properties of magnetohydrodynamics. Basically an MHD model was set up and a current was sent through it. Then a force was calculated from the relieved weight on a scale and then compared to the varying distances between the magnets. It was hypothesized that the force was proportional to the inverse of the distance between the magnets squared.

Methods/Materials
A model was made with 2 blocks of wood. Each block had a super magnet glued on, and connected by 4 rods on the corners. They were able to be moved up and down, with each block attracting the other. The bottom block was fitted with electrodes.
This model was placed in a salt solution and wires were connected to the electrodes and a generator. The model was also connected to a Styrofoam piece on a scale, connected by a light cloth string. The generator was turned on and the negative weight on the scale was read off and converted to the force generated by the model. The amperage and the distance between the current was changed to create more data and trials.

Results
The force versus the distance graph showed a hyperbolic curve, while the force versus the inverse of the distance showed a straight line, but not through the origin. A graph of the force versus the inverse of the distance squared showed a straight line through the origin.

Conclusions/Discussion
The hypothesis was confirmed through a graphical analysis of the data. However not all data points went through the origin by the line, so therefore there were some margins of experimental error. Gas bubbles from the electrolysis, unforeseen angles between the model and the Styrofoam piece and the model and the wires, and the not uniformly spread magnetic flux density lines between the two magnets all caused sources of error.
This project can be further investigated to calculate the actual average magnetic flux B between the magnets. Also it could be related to other ongoing investigations involving the study of plasma as an electrical conducting liquid and sending a current through it, thus spreading ions and creating energy.

Summary Statement
The goal is to find how the distance between magnets affect the thrust of the system.

Help Received