CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
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Project Number
J0903

Project Title
Induced Eddy Currents via Magnets in Motion

Abstract

Objectives/Goals
This study examined the effect of insulating and conductive cylindrical tubes on induced eddy currents caused by movements of magnets.

Methods/Materials
The experiment compared how long it took an N42 sphere neodymium permanent magnet and an N50 cylinder neodymium permanent magnet to drop down each tube: Bakelite, fiberglass, plastic, copper, and aluminum. Each tube was tested 10 times (5 trials with the N42 sphere magnet and 5 trials with the N50 cylinder magnet).

Results
In both cases, the magnets dropped the fastest in the Bakelite, fiberglass, and plastic (insulating) tubes, and slower in the copper and aluminum (conductive) tubes.

Conclusions/Discussion
As the magnet dropped down the conductive tubes, the changing magnetic field of the magnet created eddy currents in the tubes. These eddy currents created their own magnetic fields that repelled the original magnetic field of the magnetic, slowing down the fall of the magnet. Copper, being the best conductor, affected the magnets# drop the most and had the slowest time of drop. The insulating tubes had no effect on the magnet, regardless of the strength of the magnets. However, the conductive tubes caused the stronger magnet to drop slower. The stronger magnet had a stronger magnetic field. Thus, more eddy currents were created, and more repulsion. The hypothesis stating that the neodymium magnets will fall slower through the copper and aluminum tubes proved to be true.

Summary Statement
This study examined the effect of insulating and conductive cylindrical tubes on induced eddy currents caused by movements of magnets.

Help Received
Father helped with building the model