CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

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Project Number

31318

Project Title

The Superconducting MagLev Train

Abstract

Objectives/Goals

To build a working model of a small scale superconducting magLev train that provides sufficient dada to calculate weather or not building a full scale superconducting MagLev train is possible, and if so what would the specifications be.

Methods/Materials

Experimental procedure:
1.Build the train.
2.Lay the magnets on the track in a three magnet thick oval where the outer rows of magnets are inversely polarized to the middle row of magnets.
3.Build the mechanical motor and size it correctly on the track in order to propel the train when levitating.
4.Chose which height you would like the train to be cooled at (2mm-14mm) place train on shim and cool...wait.....and we have lift off!
5.Measure heights, weights, speeds, and times.
6.Calculations

Materials
- A 35#65#16mm High Grade, Melt Textured Yttrium Barium Copper Oxide Bulk Superconductor.
-400 .5#.5#.125" N42 Grade Neodymium Magnets.(Magnetized through Thickness)
-A .25" thick cold-rolled Steel sheet.
-Liquid Nitrogen.
-Polystyrene Plastic sheeting.

Results

The levitation height was able to be varied from 2mm-14mm due to the enhanced flux pinning effects of the superconductor. However, the levitation gets much weaker the higher the levitation. The average speed through the acceleration-gates was 3.58k/h. While the average speed through the speed-gates was 4.81Km/h.

Conclusions/Discussion

Over all, the experiment did turn out how I had anticipated. The Small scale superconducting maglev train did provide accurate data, and I actually determined that running full scale superconducting trains would not be a feasible replacement for traditional trains due to the extreme build up of cost and weight.

Summary Statement

To build a completely functional small scale Superconducting MagLev Train and use its performance aspects to determine whether or not full scale Superconducting Trains would be a feasible replacement for traditional locomotives.

Help Received

My parents helped me purchase the necessary materials, along with supervising me with the liquid nitrogen.

Preliminary