Transportation of the Future: How the Variance of Diamagnetic Properties Apply to Transportation

Moss, Jaci (School: Woods Cross High School)
Hilbig, Joshua (School: Woods Cross High School)

The Hyperloop is a new and innovative system providing a faster and more efficient alternative to air travel. Hyperloop uses magnets and diamagnetic fields to propel itself. Diamagnetism occurs when two magnets are repelled by each other. This project explores how different magnets are affected within diamagnetic fields. To test the hypothesis that the floater magnet will have a greater pull on the magnets with a greater shape and size. A D-62 lifter magnet was attached to a screw at the top of a jig and the number of turns required for levitation were quantified. Next, magnets with varying shapes and sizes were tested alongside graphite and glass to determine the optimal magnetic characteristics for repulsion and levitation. The results showed that when the glass square was paired with any magnet, the height of levitation required an increase in pull, and vice versa with graphite. These results suggest that the graphite increased the energy in the field, but the glass interrupted it. It can also be concluded that the larger magnets required a larger initial force, but overall, less energy to sustain movement. Greater quantities of graphite lead to a decrease in energy needed, but a large increase in cost. There are benefits of using a larger quantity of graphite in maglev trains and hyperloop, but it also has to be taken into consideration the cost-benefit analysis. Although the benefits are known, pyrolytic graphite is expensive, and using more magnets may provide the same results at a lower cost.

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