Novel Magnetic Levitation Train Using a Triple-Dipole-Line Track System

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Our urban population is rapidly expanding, which will require a reduction in private transportation and the adoption of faster and more efficient public transportation. Magnetic levitating (maglev) trains are new forms of transportation that have advantageous aspects adept for future use. Maglev trains have many advantages compared to conventional trains such as no energy loss due to friction, much higher speed, better safety and less noise. However, existing maglev technologies have several drawbacks that hinder its global implementation. These issues include the usage of costly cryogenic liquids, complex feedback control systems, and a high energy requirement for levitation. I can solve these problems with my maglev train prototype which utilizes a Triple-Dipole-Line (TDL) magnet track system. This system uses three dipole-line magnets (cylindrical magnets with a diametric magnetization), a pair of diamagnetic rods (graphite), and a styrofoam vehicle model. This prototype successfully exhibits perpetual levitation with completely zero energy input, a very desirable characteristic that solves several limitations of existing maglev systems. In this project I investigated the fundamental physics and engineering aspects of the system: basic characteristics of a dipole-line magnet, diamagnetic levitation based on a magnetic cushion effect, the critical gap for maintaining levitation, the vehicle's lateral stability, and the load bearing capacity of the maglev. My research and prototype serves as an alternative and improved maglev technology for future global implementation.

Awards Won:

Patent and Trademark Office Society: Second Award of $500