Essential Features of Hyperloop Systems

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The purpose of this experiment was to test the importance of four separate factors in a hyperloop system and to see if a combination of all of the factors produced greater velocities than the other tests. This experiment was performed to determine which features are worth the cost and energy required to install and operate them. A model hyperloop tube was created with a manual hand pump to create an area of high pressure behind a ball valve. When the valve was opened, the cart would launch down the track and the velocity would be recorded. This procedure was repeated several times with tests of magnetic levitation using a Halbach array, an area of vacuum pressure, and a combination of the two. Another test was conducted using copper coil and a battery with two strong neodymium magnets on either end, functioning as a linear electric motor. The linear electric motor was unable to move, and when this was implemented into the vacuum system, it yielded no significantly different results. The system that yielded the greatest velocity was the vacuum system with implemented magnetic levitation. This was expected, as the less opposing frictional forces on an object, the greater the net acceleration can be. Based on my results, the most efficient hyperloop system would consist of an area of high pressure behind the cart, moving it through a vacuum as it levitates over an opposing Halbach array. These results would suggest against the use of a linear electric motor.

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