Project Presentation

MAGNETIC SUSPENSION FOR VEHICLES

Division: I

DEPARTMENT OF COMPUTER ENGINEERING

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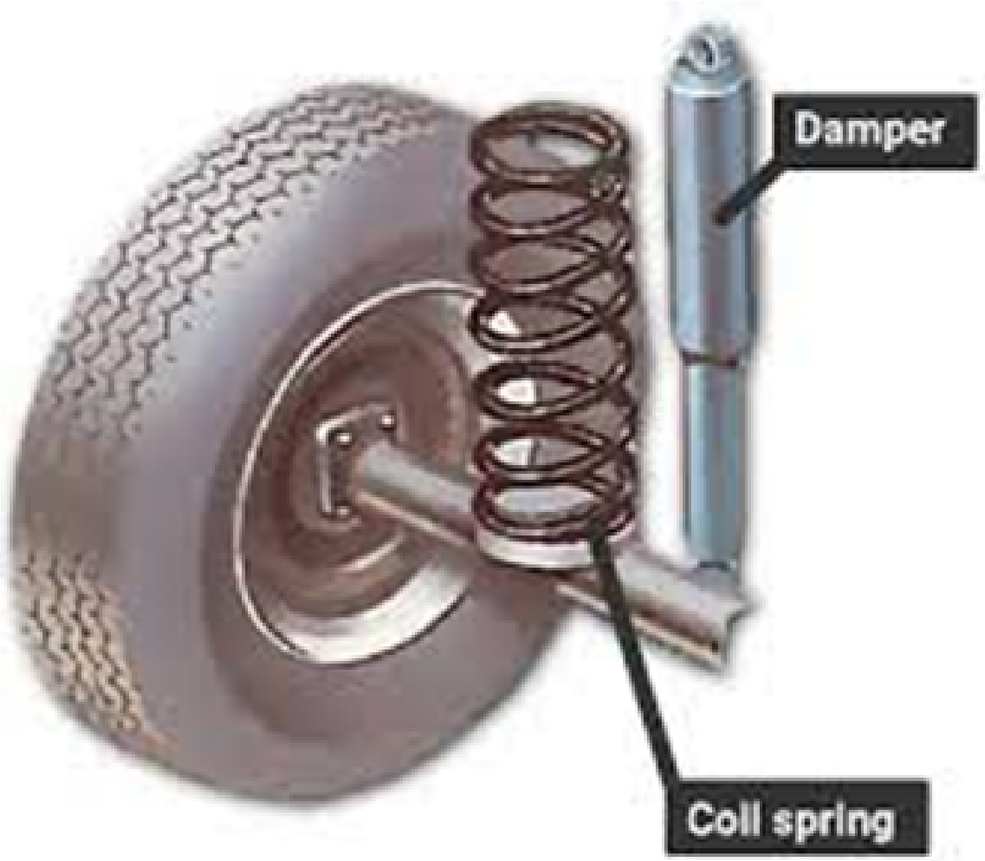
Problem Statement

- To create an alternative suspension system for spring-damper systems using magnets

Introduction

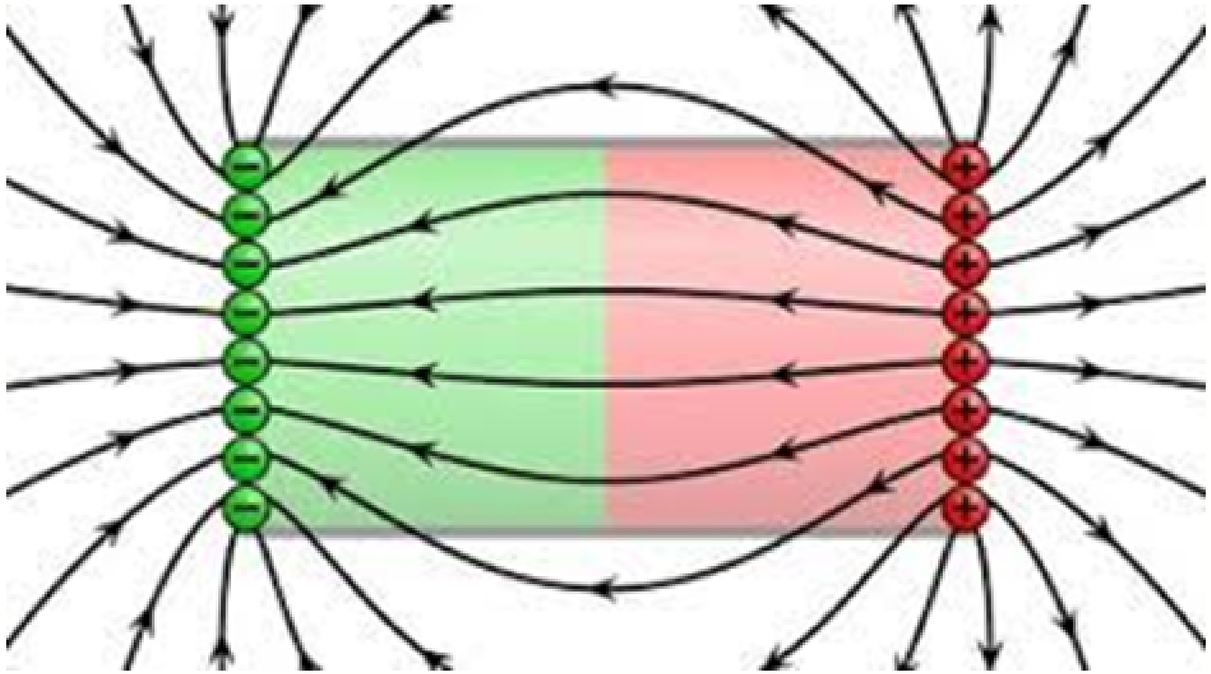
- Vehicle suspension: Absorbs shocks and vibrations for a comfortable ride.
- Traditional spring-based systems: Effective but have drawbacks
- Project goal: Explore magnetic suspension as an alternative solution.
- Potential benefits: Improved ride comfort, enhanced stability, superior handling.
- Overall objective: Address shortcomings of traditional suspensions for advanced vehicle technology.

Spring-damper Suspension



Theory

- Magnets have natural ability to repel each other
- If movement is restricted, magnets can levitate
- This levitation will be used for the suspension system

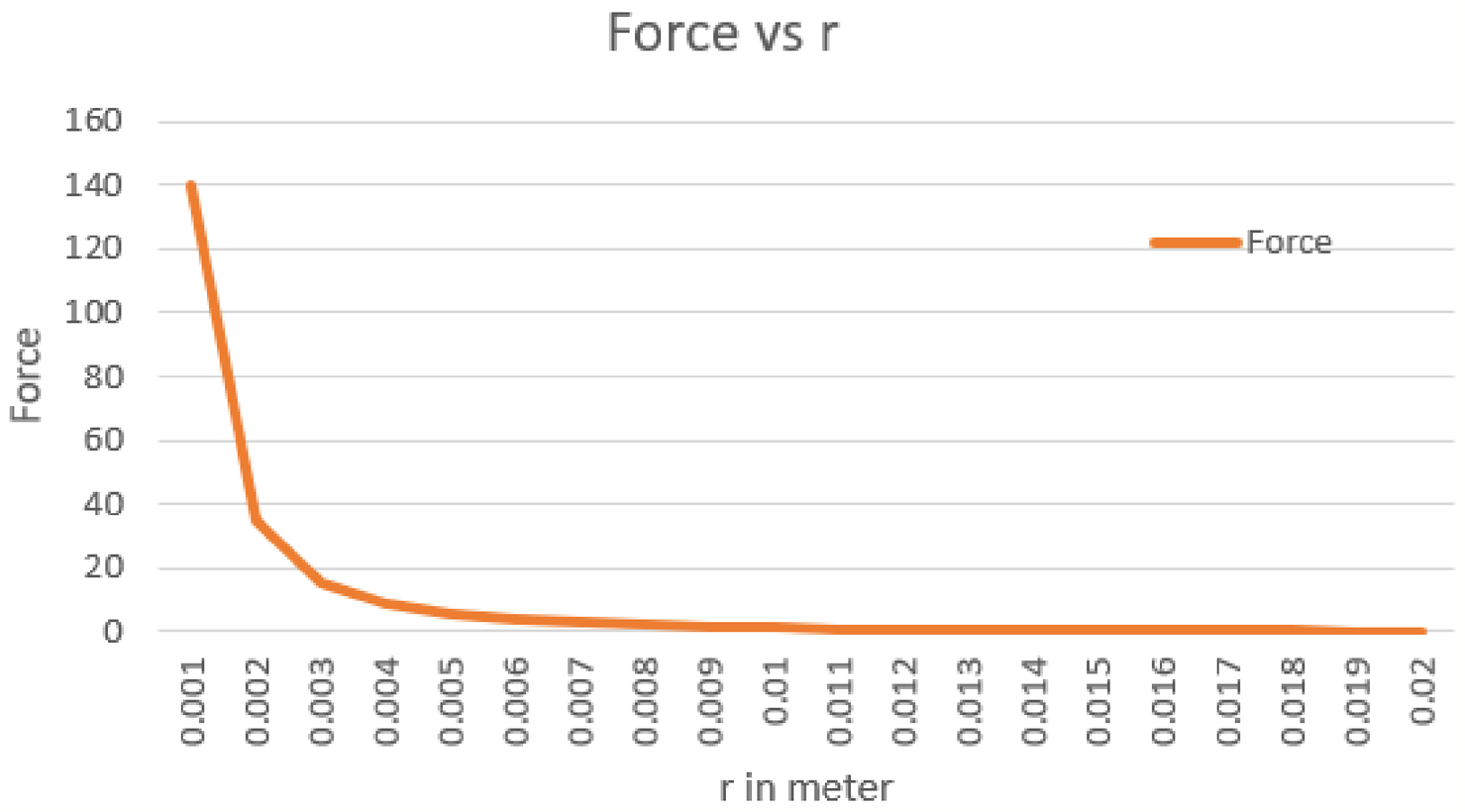


Magnet

Neodymium magnets:

- Developed in 1982
- Consist of neodymium, iron, and boron.
- Strongest commercially available permanent magnets.
- Exceptional strength
- Crucial for magnetic repulsion and levitation.
- Applications include magnetic bearings, couplings, and a range of technological innovations from levitation displays to industrial systems.

Calculations



Graph of repulsive force with displacement

Prototype

- Magnets fixed inside cylinders, repel each other causing levitation
- This generates a gap between chassis and undercarriage
- When vehicle moves over bumps in road, repulsive forces absorb the upward motion of wheels
- This keeps the chassis from experiencing jerks

Prototype

- Mass of battery: 35g
- Mass of top chassis: 96g
- Total sprung mass= 131g
- Force on suspension due to frame=F=ma= 1.31 N

Advantages

- Magnetic shock absorbers largely reduce friction.
- It also avoids wear
- It has very low maintenance requirements.
- It is cheaper in comparison to spring suspensions
- It is free from wear adjustment

Future Scope

- Improvements could include increased stability, better ride comfort, and increased energy efficiency.
- The goal of research and development could be to improve technology so that it can be widely used in different kinds of vehicles, making transportation easier and more effective.
- Active suspension can be achieved by creating a system based on electromagnetism.

Conclusion

- Controlled driving experience through rapid suspension adjustments using magnetic fields.
- Improved durability by reducing mechanical wear and tear.
- Magnetic suspension is a promising technology for automotive engineering.
- Challenges include cost and complexity, but the technology holds promise for the future.

References

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Thank You