improved living standards for the people of Libya.

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REVOLUTIONIZING AIR TRAVEL: THE POTENTIAL OF BALL BEARING PROPULSION IN UNMANNED AERIAL VEHICLES

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Abstract: Ball bearing has revolutionized the sectors of Aerospace Engineering, Marine Engineering, Automotive Engineering, and many others. The ball bearing's job is to reduce friction in mechanical rotations, such as using the motor. There is also interest in growing Rim Thrusters, which are hubless and aim to revolutionize the propulsion industry. In the design of ball bearing propulsion, its unique design from the electrical motor takes the shape of a ball bearing, which is more efficient than hubs as well as rim thrusters

Keywords: Unmanned Aerial Vehicle, Motor, Rim Thruster, Ball Bearing and Propulsion.

Introduction

The introduction of ball bearings has sparked a revolutionary wave in Aerospace, Marine, and Automotive Engineering, catalyzing significant progress and advancement within these sectors. By effectively reducing friction in mechanical rotations, particularly within motors, ball bearings have become an indispensable component of modern engineering. Concurrently, the emergence of Rim Thrusters, a novel innovation operating autonomously from hubs, has generated considerable interest, poised to transform the propulsion industry.In the realm of ball bearing propulsion, its unique design, inspired by electrical motors, offers a more efficient alternative to traditional hubs and rim thrusters. This innovative concept not only aims to redefine propulsion technology but also has the potential to function as an electrical generator. Consequently, the sphere of ball bearing propulsion seeks to revolutionize the dynamics of aerospace, automotive, and marine engineering, signaling an imminent paradigm shift within these crucial sectors. As these advancements continue to progress, the interaction between ball bearings and rim thrusters is expected to pioneer new frontiers for improved efficiency and performance in engineering applications.

Results and discussion

The hubless rim thruster represents a cutting-edge propulsion system primarily utilized in marine applications, with ongoing exploration for its potential integration into aircraft propulsion. However, significant hurdles persist in harnessing the full capabilities of this technology. The primary challenge lies in addressing the bearing and air-gap dilemma. In conventional motors, maintaining a precise air gap, typically ranging between 0.5-1 mm, is crucial for optimal performance. However, this narrow tolerance poses a dilemma for rim thrusters, as a traditional central bearing system with a large diameter would leave excessive rotor material vulnerable to deformation. Unlike conventional fan designs, which rely on a centerline shaft for rotational motion, rim-driven thrusters employ a mechanism situated at their outer radius to induce rotation in the fan. This innovative configuration eliminates the necessity for a central hub, thus enabling an uninterrupted flow of fluid through the core of the fan. Our study introduces a rim-driven thruster propelled by the interaction of electric and magnetic fields, akin to brushless motor technology, with the entire fan and its supporting structure resembling the roles of rotor and stator, respectively. Overall, while promising, the current design of rim thrusters necessitates substantial refinement to realize their potential in practical applications.

To elucidate this concept, the research drew upon peer-reviewed journal websites to inform the design of the ball bearing. The study elucidates its prospective application in real-world scenarios. The ball bearing's design is slated for integration into UAVs, with a focus on maximizing efficiency. This investigation seeks to enhance thruster performance compared to earlier iterations through the incorporation of a ball bearing system. In aerospace contexts, emphasis is placed on noise and drag reduction, while in marine and automotive engineering, it guarantees optimal operation by facilitating higher RPMs (fig 1.).

a b

a : Electric motor propulsion Ball Bearing, b: Automotive Engine

Fig 1 – a ball bearing system designed to power an electric motor

Although electric motors consume more electricity than any other technology in industrial and commercial applications, today's energy-efficient and premium-efficiency motors can significantly reduce energy use and costs. The secret to these savings lies in the motor's efficiency its shaft or mechanical output power divided by its electrical input power. In fact, it has been shown that an improvement [3] as well as Bearings support the rotating shafts of the wheels, gears, turbines, rotors, etc. in those machines, allowing them to rotate more smoothly. At the core of the ball bearing lies a metal component strategically positioned within the rolling element, aimed at minimizing friction. Across various sectors, its predominant purpose remains consistent: facilitating magnetic propulsion to ensure the seamless rotation of the internal rolling element. This pervasive incorporation of magnetic principles into ball bearing design stands as a key driver for elevating operational effectiveness and efficiency within industries such as aerospace, marine, and automotive. Utilizing ball bearings in aircraft propulsion systems enhances thrust across various terrains - land, water, and air. Moreover, it effectively reduces vortex, drag, and cavitation both in the air and on land. This improvement is attributed to the intricately designed mechanism embedded within the ball bearing structure.

Conclusion

The propulsion system fashioned in the shape of a ball bearing aims to enhance efficiency. Its distinctiveness lies in its ability to amplify efficiency through a multifaceted focus on the rolling element. The collaboration between the upper and inner circles synergistically enhances efficiency, while the design of the middle section facilitates quicker rotation, thereby maximizing performance to its fullest potential.

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ADVANCEMENTS IN PLASMA-BASED WIRELESS ENERGY TRANSFER TECHNOLOGY FOR TRAIN TRANSPORTATION SYSTEMS

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Abstract: The advancements in the application of plasma-based wireless energy transfer (WET) technology for train transportation systems. Plasma-based WET offers a promising solution to address the growing demand for efficient and sustainable energy transfer methods in the transportation sector. This paper discusses the principles, components, advantages, challenges, and potential applications of plasma-based WET in the context of train transportation. Furthermore, it highlights the importance of addressing safety concerns, cost considerations, and compatibility issues to facilitate the practical implementation of this technology.

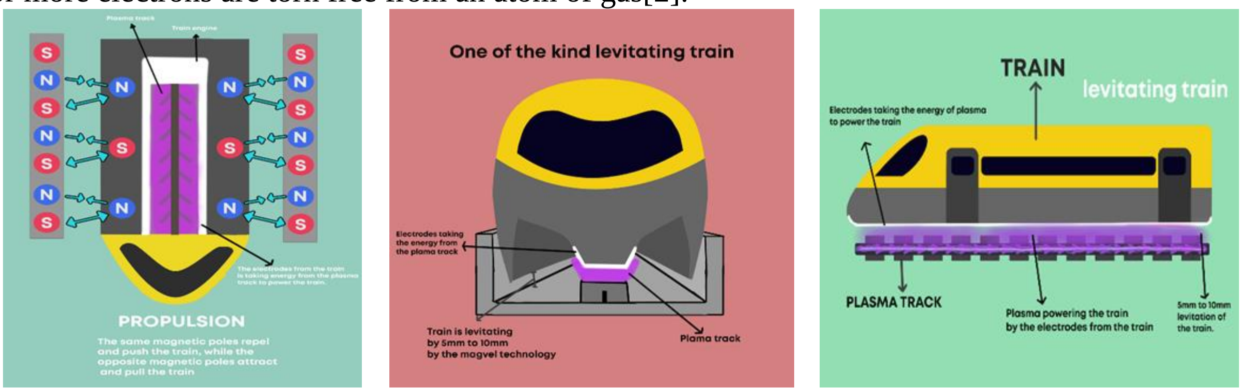
Keywords: Plasma-based wireless energy transfer, Train transportation systems, Electromagnetic induction, Sustainability, Energy efficiency.

Introduction

The transportation sector is undergoing rapid transformation towards more sustainable and energy-efficient solutions. In this context, the development of plasma-based wireless energy transfer (WET) technology presents an innovative approach to power trains without the need for physical contact or frequent stops for recharging. This paper explores the feasibility and potential benefits of employing plasma-based WET in train transportation systems.

Results and discussion

Plasma-based WET operates on the principle of electromagnetic induction, where energy is transmitted wirelessly through the generation of a magnetic field between a transmitter and a receiver. Plasma, an ionized gas, is utilized to enhance the efficiency and range of energy transfer by providing a conductive medium. Some common types of plasma reactors exhibit better energy efficiency than others [1]. Electrical plasma is an electrically charged gas that is created when one or more electrons are torn free from an atom of gas[2].



a b c

a .Above view of train, b. Front view of train, c. one view of Train

Fig 1. Plasma-Based WET

The key components of plasma-based WET include the transmitter and receiver units. The transmitter generates a high-frequency alternating current to create a plasma field, while the receiver