Electromagnetic Launch Systems

White Sands Missile Range, Nevada, August 17th 2037. The United States Advanced Propulsion Laboratory Nevada Division reported that a crew of 5 astronauts have successfully reached orbit on the new Liberty-class Spaceplane. According to lead Scientist, Reid Mitchell, the crew, their Vehicle, the Iowa-Star, and the payload of food and supplies for the South Lunar Research Base have achieved a stable orbit and will depart for the South Pole of the Moon within the next few hours. The groundbreaking achievement, however, is that the 3 million ton vehicle was launched into orbit using a electromagnetic launch system with a similar design to the "Maglev" trains that criss-cross Europe…

Space, though it is a nearly empty void, has entranced mankind for millennia. Eventually, humans left the confines of this small blue planet and began to explore their solar system. A small, beeping satellite started a multi-billion dollar quest for exploration.

However, this news is now nearly sixty years old. Since 1951, countless numbers of satellites, spacecraft, and space stations have been launched into Earth's orbit using the same methods, liquid-fuel and solid-fuel rockets. As humanity reaches higher and farther than ever before, what can scientists say about the advancement of their launch systems? True, the new systems are safer, faster, more efficient, but in reality they are the same loud and polluting rockets first used to launch Sputnik. In fifty years scientists have researched and proven such ideas as the ion drive, using charged ions to propel craft, and the 'solar-sail', currently being tested by the Japanese Space Agency. Unfortunately these propulsion systems still require a rocket to initially place them in orbit. As mankind enters the 21st Century, it is the dawn of a new age of space travel.

Engineers should begin research into new electromagnetic technologies to replace standard solid-fuel and liquid-fuel rockets. Classified as 'Mass-Drivers', electromagnetic launch systems are essentially over-glorified railguns, using electromagnetic coils or linear motors to literally fling spacecraft into space. The Space Studies Institute first tested railguns and coilguns in 1975, but the electromagnetic linear motors burned out and failed after repeated use. By researching towards and synthesizing new alloys and composite materials, engineers can construct more efficient and durable electromagnetic systems.

A mass-driver can be configured in two ways. The first is to launch the spacecraft at escape velocity on a journey to the moon or other planets. A mass-driver can also accelerate the craft enough to reach a low orbit, where a rocket engine will stabilize its trajectory. Unfortunately, the hypersonic and supersonic speeds necessary for an effective launch place more G-Forces on the occupants than any human can endure. Fortunately, current research shows that a small rocket engine, built into the spacecraft itself, can be used along with a less-powerful launch from a mass-driver to place the ship into a stable orbit. Any unmanned vehicle can easily be hurled at hypersonic speeds into the upper atmosphere and beyond.

Electromagnetism has been proven over time to be nearly 30 orders of magnitude stronger than gravity, showing that such a system can be more efficient than current methods. By using renewable energy sources to power the mass-driver, this system can launch an incredible number of spacecraft and satellites for the cost of a single rocket. At only about $745 per kilogram of cargo, the mass-driver can pay for itself in a matter of years, according to researchers at Launch-Point Technologies. Also, by building the electromagnetic track in a circular pattern, the spacecraft can accelerate continuously until it reaches the appropriate velocity, allowing a mass driver to be built within a relatively small footprint.

By switching to a mass-driver, NASA and scientists can also help the environment. A normal rocket uses tens of thousands of pounds of rocket fuel in order to escape Earth's gravitational field, dumping greenhouse gases and other damaging compounds into our fragile ecosystem. Additionally, debris created by spent booster stages and abandoned satellites remain a major hazard to astronauts and cosmonauts. Using a mass-driver, these polluting and littering stages can be completely eliminated, saving the environment and lives in orbit. Also, noise pollution has been unfortunate problem at airports and launch centers such as Cape Canaveral. Alternatively, the only sounds created by an electromagnetic mass-driver are sonic booms as the craft leaves the launch system. In a future where space-travel is a daily occurrence, these launches must be as quiet, clean, and efficient as possible, easily accomplished with an electromagnetic mass-driver.

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