

Space Propulsion

(Nuclear Fusion)

Success has been achieved from research and development work conducted on a unique concept for creating and controlling nuclear fusion reactions. As we have dreamed of expanding our race beyond the planet Earth, it has been apparent that a high power, low mass energy system would be needed. The ratio of power to mass is essential in determining how fast the rocket can go, where it's going, and its mass determines how much will it cost to launch. So, there are two choices for power systems that is Nuclear Fusion and Antimatter Annihilation.

Antimatter is inherently dangerous as a loss of contaminant means almost certain destruction for anything around it. For these reasons, we took a serious glance on the application of advanced fusion technologies.

Nuclear pulse propulsion or external pulsed plasma propulsion, is a hypothetical method of spacecraft propulsion that uses nuclear explosions for thrust. The rocket uses a form of magneto-inertial fusion to produce a direct thrust fusion rocket. It is totally based on nuclear reactors such as deuterium, tritium, helium and so on. Powerful magnetic fields cause large metal rings (likely made of lithium, where a set for one pulse has a total mass of 365 grams) to collapse around the deuterium-tritium plasma, compressing it to a fusion state. Energy from these fusion reactions heats and ionizes the shell of metal formed by the crushed rings. The hot, ionized metal is shot out of a magnetic rocket nozzle at a high speed (up to 30 km/s). Repeating this process roughly every minute would propel the spacecraft.

The performance gain of nuclear propulsion systems over chemical propulsion systems is overwhelming. Nuclear systems can achieve space missions at a significantly lower cost due to the reduction in propellant requirements. When humanity gains the will to explore and develop space more ambitiously, nuclear propulsion will be an attractive choice.

Key words: Propulsion, Nuclear Fusion, Fusion Rocket, Propelling the spacecraft.