FUSION PROPULSION
DIRECT FUSION DRIVE

DATA SHEET

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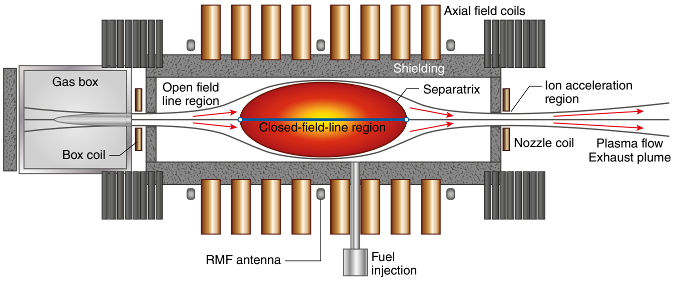
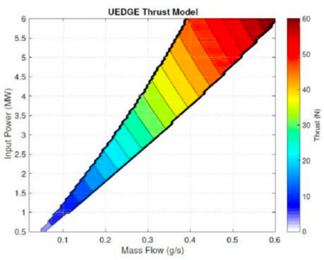


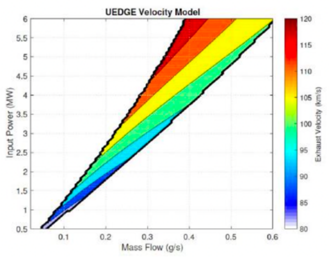
PRODUCT DESCRIPTION

The Direct Fusion Drive is a revolutionary steady state fusion propulsion concept, based on a compact fusion reactor. It will provide power of the order of units of MW, providing both thrust of the order of 10–101N with specific impulses between 103– 105s and auxiliary power to the space system

Forecasted Statistics

Specific Impulse	103 -105s
Thrust	10 - 101 N
Propellant	D - 3He
Exhaust Speeds	110 – 350km/sec
Dimension	9.8m x 3.5m x 3.5m

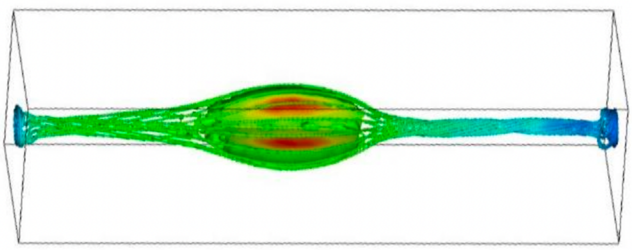




TIMELINES

Pulsar Fusion is presently committed to the construction of its initial prototype static DFD engine. After completing a State of the Art (SoA) assessment on DFD heating technology in 2021, further analysis was carried out by a panel of experts to finally make an informed decision on an initial design point for the system. Pulsar has now proceeded to phase 3, the manufacture of the initial test unit. Static tests are to begin in 2023 followed by an In Orbit Demonstration (IOD) of the technology in 2027.

Hybrid simulation of FRC spin-up

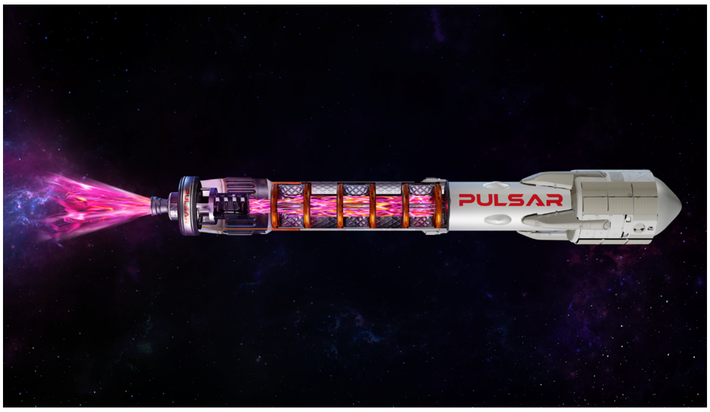


APPLICATION

The Direct Fusion Drive (DFD) is a compact nuclear fusion engine which could provide both thrust and electrical power for spaceships. This technology opens unprecedented possibilities to explore the solar system in a limited amount of time and with a very high payload to propellant masses ratio. This engine is attractive for long missions where a lower thrust version of the engine, having a propellant mass ratio near unity, provides efficiencies that other engines cannot achieve.

As for a mission outline, the proposed target was decided to be Titan as a typical destination. There is an interest to aim for the following requirements:

•< 1 year travel time
•10,000kg payload.



THRUST GENERATION

The DFD main feature is that thrust is achieved via a direct process, in which an ionized propellant fluids heated in a fusion chamber by the fusion products resultant from a D -3He reaction, and then directly expanded into the nozzle in a process called thrust augmentation, which will grant thrust to the spacecraft, while at the same time providing heat to generate auxiliary electric power to the spacecraft systems. The plasma in the reaction is confined using a Field Reversed configuration and an odd parity rotating magnetic field (RMF) as heating method.