Design and Technologies for Hyper-Velocity, Ultra-High Velocity and Relativistic Missiles

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Abstract:
The design, engineering, technologies and materials of missiles for atmospheric and extra-atmospheric flight are presented. Chemical propellants are augmented by combination with electromagnetic technologies. Key enabling technologies are:

- Electromagnetic launch technology (EML) operating with high-current superconducting coils.
- Low-temperature atmospheric plasma (plasma sphere) is used to protect outer skin against frictional heat from interaction with gaseous atmosphere.
- Magnetic containment of the primary chemical plasma in the reaction chamber is protecting the reaction chamber material.
- Energy injection into the plasma serves to increase temperature and thrust by energizing with RF (radio frequency) heating (high power solid-state microwave devices) to > 1 million degrees with plasma accelerator (neutral plasma, positive and negative ions).
- Magnetic compression of plasma is applied to achieve higher temperatures and thrust. Increase of temperature may provide density and temperature of fusion conditions.
- Vectorization of plasma stream to steer flight path is achieved by means of varying electromagnetic fields (switching of superconducting coils).
- Magnetosphere (outer magnetosphere) serves to protect against charged particles (damaging for electronics and sensors).
- Solid-state electronics to withstand the high g-forces (>20.000 g) of missile flight path changes.
- Energy derived from onboard nuclear micro-reactor turned critical by chemically induced magnetic compression. The reactor is equipped with thermionics unit for direct conversion of heat to electricity with high conversion efficiency. Alternative high-density energy sources are nuclear isomers.

The key technologies are presented and integrated into three designs for different velocity ranges:
- up to 10 km/s
- up to 1000 km/s
- up to 100 000 km/s

8 Pictures (computer engineered designs) depict the missile with its overall design, the launch equipment, the reaction chamber, the outer plasma sphere, the inner magnetic containment, the energization and magnetic compression, the vectorization of the exit plasma stream.

85 references

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