The USE OF RF WAVES IN SPACE PROPULSION SYSTEMS

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This paper will review the ways in which rf and microwave radiation may be used in the design of electric propulsion systems for spacecraft. Rf power has been used or proposed in electric propulsion systems to ionize, to heat, and to accelerate the propellant, or to produce plasma used to inflate a magnetic field for solar sail purposes. Direct Rf propulsion using radiation pressure or ponderomotive forces is impractical owing to efficiency considerations. Examples of various systems that have been developed or proposed will be reviewed. The Variable Specific Impulse Magnetoplasma Rocket (VASIMR) uses RF for producing, heating and accelerating plasma. Inductive rf and microwave ion thruster schemes use e-m waves to ionize the plasma, which is then accelerated by use of dc grids. The details of the VASIMR and a microwave ion thruster will be discussed and contrasted with related RF systems.