

ELECTRIC PROPULSION FOR SPACE: An Overview and Some Technology Challenges

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Spacecraft Electric Propulsion – what is it, why use it and some of the challenges

Electric Propulsion (EP) has been around as a concept for over 100 years or so, and was first tested in space 50 years ago, but has only recently begun to be used in “real” missions. The talk will firstly introduce the fundamentals of space propulsion to try to put into perspective how electric propulsion compares with other propulsion technologies, with particular emphasis on the influence of exhaust velocity. A brief overview of the different types of electric propulsion devices will then be given, focusing on the physical basis of the acceleration processes and typical performance characteristics. A more detailed description of the research on EP at the University of Southampton, which focuses on Gridded Ion Engines (GIEs), Hollow Cathodes (HCs) and Pulsed Plasma Thrusters (PPTs), will be presented. Several current and future applications will be described, including future large GEO communication satellites and two exciting ESA missions that use the UK GIEs: GOCE (already flown using the T5 for drag compensation) and Bepi Colombo, a mission to Mercury, which will use the T6.