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Coupled Electrodynamic Tether/Electrostatic Propulsion System

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ABSTRACT

The paper will describe a novel space propulsion system combining Electric Propulsion (EP) and propulsion from Electrodynamic Tethers (ET). The application would use the planetary magnetic field, such as that of the Earth, to generate propulsion from both an ion thruster and the thruster's current through a tether. One electrical power-generating unit will drive for both the electric propulsion system and the Electrodynamic Tether system.

More specifically such would mean that the current necessary for the electric propulsion would be guided through a conductive tether. When this tether would go with high speed through the magnetic field a Lorentz force will be generated resulting in an increased propulsion capability. Not only the thrust can be increased, but also the combination of available Lorentz force, electric propulsion force and orbital dynamic forces can be combined and adjusted for a particular desired behaviour of the tether itself.

This paper will present in detail the physics and the potential applications of this concept, which was recently patented by ESA (ESA/PAT/466).