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The Physics of Vacuum Arc Propulsion Systems

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The Vacuum Arc Thruster (VAT) is an unconventional plasma propulsion system with unique advantages for small satellite applications. The relevant literature and figures of merit were presented. An inductive energy storage pulsed power circuit was built which delivered triangular submillisecond current pulses to a coaxial VAT. The dense copper plasma, the expansion of the macroparticle plume, high velocity luminous micro-droplets and cathode ablation were documented among other plasma phenomena. A pulse forming network was built to deliver square pulses with higher current to the VAT. Thruster performance differences between the two circuits are discussed. The fractal and explosive ecton models of the arc are considered. The retrograde motion of the cathode spots is discussed with special attention given to the balance of plasma and magnetic pressure. Finally, ion current density measurements are presented.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

Msc

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