

IAF SPACE POWER SYMPOSIUM (C3)
Space Power System for Ambitious Missions (4)

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IMPLEMENTATION AND PERFORMANCE EVALUATION OF SUPERCAPACITORS AS A POWER
SOURCE FOR ANTENNA DEPLOYMENT IN NANOSATELLITES**Abstract**

Successful antenna deployment is of vital importance for satellite communication. To comply with the nanosatellite standards, the antenna deployment design for the RVSAT-1 involves a highly reliable burn wire release mechanism. This paper provides an insight on using supercapacitor as a power source for antenna deployment.

Highly reliable supercapacitors have several advantages over conventionally used batteries. For potent accomplishment of antenna deployment, supercapacitor outruns the electrochemical batteries. This is possible as they possess high energy density, higher charge-discharge rate in addition to reduced heat generation in contrast to equivalent batteries on grounds of its low internal resistance and high efficiency. The unusual requirement of very high discharge rate for a short duration of antenna deployment forces the use of battery with higher CDR (Continuous Discharge Rate) compromising on the effective capacity of the battery. When a battery is discharged at an elevated rate, a whopping amount of heat is generated that may result in thermal runaway.

The proposed system is simulated using MATLAB & Simulink. Several simulation results are presented in order to verify the effectiveness of the proposed design considerations. The paper concludes with a theoretical study of the proposed design and the parameters involved in the charge-discharge cycle of the supercapacitor for seamless antenna deployment.