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TITLE: Optimized Design of Power Supply for CubeSat at Aalborg University

THEME: Design Oriented Analysis of Electric Machines and Power Electronic Systems

PROJECT PERIOD: 1.09.2001 to 4.01.2002

PROJECT GROUP: PED9-17C

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ABSTRACT

This project deals with the design and implementation of a power supply for the CubeSat student satellite. The satellite will be constructed and operated by students at Aalborg University.
Design of the power supply will be an optimized design which will take into account problems like redundancy, reliability and efficiency.
The main objective for this present project work is to realize a design oriented analysis over a real challenge. A student satellite is to be launched in space and the power supply subsystem must be realized. In order to accomplish the task, few topologies of the power supply will be analyzed. The best solution is chosen, efficiency of the system being one of the most important criteria.
For practical implementation, components are selected taking into account space reserved for the board inside the satellite and the operating temperature range.
Thermal analysis of the power subsystem is performed and basis for a more extended analysis for the whole satellite are stated.
Housekeeping data must be acquired for the solar cells, batteries and different users.
Partial measurements performed are showing that the system designed can work in concordance with the requirements and future improvements will be added, if they are necessary.

Preface

This present project "Optimised Design of Power Supply for CubeSat at Aalborg University" is written by Group PED9-17C at the 9th semester on the Master of Science Education in Electrical Engineering at Aalborg University. The project period is 1.09.2001 to 4.01.2002.
The main goal of the project is designing and practical realization of the power supply for the CubeSat sattelite.

The report consists of two parts: a main part and an appendix part.

The main part consists of seven parts (1-7), defining the demands for the application in which the power supply is seen as a subsystem. Based on critical comparison between simulations and measurements, conclusions will be drawn concerning the accuracy of the proposed models and the use of the chosen control solution concerning the application.

The appendix part contains five parts (A-E) where the used additional material is presented, and circuit diagrams are included. A list with symbols and common used abbreviations can be found in Appendix E.

The report uses SI-units. Literature references are stated by [*Author, Year, Page*], for example [*Mohan, 1995, p.164*]. A complete list of used literature may be found at the last page of the main part of the report. Figures and equations are numbered in succession within each chapter and appendix, for example, figure three in chapter 4 is named *figure 4.3*, and equation three in chapter 4 is named (4.3).

Aalborg, 4.01.2002

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