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City University of Applied Sciences

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Eduardo Olmeda Diaz

Satellite Electrical Power Subsystems: Energy Balance, Modeling and Sizing Tools.

ABSTRACT - Masterthesis

This paper present the research and development work of an Electrical Power Subsystems (EPS) energy balance and sizing tool.

Implemented within the environment of EcosimPro, this tool comprehends mathematical models of key units such as batteries, Solar Arrays (SA), loads and typical components of the Power Conditioning and Distribution Unit (PCDU). All these have been built on an easily scalable manner which allows users to size units according to the specific mission needs.

In order to achieve this goal, an extensive research have been carried out, focused on identifying key points to be modeled. The power sources (batteries and SAs) a sensitive point due to the many environmental and aging constrains to be considered. The initial target battery cell type has been the ABSL18650HC from ABSL Power Solutions Ltd., while SA cells have been defined on a generic manner, which allows to virtually include any kind of cell type.

Finally, correlation activities have been performed with real cases, such as SGEO and EDRS satellites in order to validate the developed models.