

SPACE SYSTEMS SYMPOSIUM (D1)  
Interactive Presentations (IP)

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APPLICATION OF OPTIMIZATION TO SUPPORT RESPONSIVE NANOSATELLITE SYSTEM  
ENGINEERING

**Abstract**

Responsive engineering practices commonly used in nanosatellite systems development frequently result in large variance and/or further definition of requirements throughout and later in the development process. Examples include, accommodation of payload systems with ill-defined specifications refined during test, and the late change in launch opportunities leading to variations in orbital parameters. Efficiently assessing impact on the design imposed by accommodating or rejecting change is essential within such projects, given the small teams and resource limitations. As a result, and as part of a larger \*craft design tool development, optimization widgets have been implemented using a generic Multi-Objective Evolutionary Algorithm (MOEA) applied to common satellite system engineering change problems. Two applications of the optimiser are explored: for solar panel configuration and internal module stack sequencing, reflecting a change to the orbit impacting power generation capacity and internal reconfiguration to accommodate a change in payload respectively. The tool presents an interactive GUI to allow an expert user to explore potential design solutions for further and iterative refinement. Results of comparative studies to contrast results from those using purely expert judgement for a range of users is presented, showing the value of the tools in support of day-to-day systems engineering. To conclude, reference to real world as-implemented solutions for ongoing missions are presented, highlighting commonalities and future improvements for the tool.