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ACCELERATE SPACECRAFT PROX-OPS DESIGN AND ANALYSIS WITH SODA

Abstract

Current human space flight operations involve different types of visiting spacecraft which dock at multiple docking ports. Visiting Vehicle (VV) operations near other spacecraft or space stations, if not properly designed, pose potential issues with thruster plume loading and contamination of solar arrays, excessive propellant use, high structural loads etc. For these reasons specific analysis of VV proximity operations must be performed for mission design and operations.

Visiting vehicle proximity operations analysis has historically required significant time and resources to perform. The typical process uses complex, high-fidelity models and simulations which require significant setup, long run times and repetition to produce results. This process is inefficient and costly to businesses and taxpayers alike.

Spacecraft analysis teams will benefit from a two-step systems engineering process that uses screening tools to rapidly identify potential issues which can then be analyzed further using high-fidelity simulations. The screening tools use adequate fidelity models that produce reliable results with setup and execution times orders of magnitude faster than high fidelity simulations. They are used to rapidly reduce the operational and design search space.

The Spacecraft Operational Design and Analysis (SODA) Windows platform stand-alone software tool was developed to allow for quick turnaround of “what if” scenario analyses that provide 80

This paper discusses tool capabilities and presents applications of the tool to various spacecraft missions.