PLANETARY PROBE SCIENCE PAYLOAD MISSION DESIGN TOOL

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ABSTRACT

Throughout the development of planetary probe missions from initial concepts, identification of flight qualified hardware components that meet mission requirements is key to mission success. Selection of the required instrumentation for interplanetary science missions is an involved, complex process. Scientific measurement requirements are determined from the initial interplanetary probe's science mission concept of operation, goals and objectives. From the science payload, design of the spacecraft systems can be achieved.

The Science Payload Design Evaluation Tool (SPDE) to be presented in the paper, comprises a database collection of individual sensor modules of commercial, space-rated and flight-proven components. The tool developed determines the required components based on the mission concept of operations. Information on the planetary probe's mission objective and types of science data to be collected, along with payload limits is entered into the main program interface. For each sensor type available within the program, corresponding modules are executed and information is supplied relevant to planetary location and sensor requirements. Flight hardware components are the results of selections made based on the mission required operational range and performance capability.

Built upon the In-Situ Sensor Payload Optimization Tool framework, the SPDE tool incorporates additional sensor design modules and a graphical user interface for simple mission design. Based on the determined sensor packages, design parameters for the associated space vehicle hardware are established for each of the vehicle's subsystems.