systems that utilize physicochemical and biological processes to recycle air and water, and process wastes in order to reduce the need of resource resupply. By assuming steady-state operations, ALSSAT is a means of investigating combinations of such subsystems’ technologies and thereby assisting in determining the most cost-effective technology combination available. In fact, ALSSAT can perform sizing analysis of the ALS subsystems that are operated dynamically or steady in nature. Using the Microsoft Excel® spreadsheet software with Visual Basic programming language, ALSSAT has been developed to perform multiple-case trade studies based on the calculated ECLSS mass, volume, power, and Equivalent System Mass, as well as parametric studies by varying the input parameters. ALSSAT’s modular format is specifically designed for the ease of future maintenance and upgrades.

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MSC-23506

Control Software for a High-Performance Telerobot

A computer program for controlling a high-performance, force-reflecting telerobot has been developed. The goal in designing a telerobot-control system is to make the velocity of the slave match the master velocity, and the environmental force on the master match the force on the slave. Instability can arise from even small delays in propagation of signals between master and slave units. The present software, based on an impedance-shaping algorithm, ensures stability even in the presence of long delays. It implements a real-time algorithm that processes position and force measurements from the master and slave and represents the master/slave communication link as a transmission line. The algorithm also uses the history of the control force and the slave motion to estimate the impedance of the environment. The estimate of the impedance of the environment is used to shape the controlled slave impedance to match the transmission-line impedance. The estimate of the environmental impedance is used to match the master and transmission-line impedances and to estimate the slave/environment force in order to present that force immediately to the operator via the master unit.

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MSC-23742

Architecture for Verifiable Software

Verifiable MDS Architecture (VMA) is a software architecture that facilitates the construction of highly verifiable flight software for NASA’s Mission Data System (MDS), especially for smaller missions subject to cost constraints. More specifically, the purpose served by VMA is to facilitate aggressive verification and validation of flight software while imposing a minimum of constraints on overall functionality. VMA exploits the state-based architecture of the MDS and partitions verification issues...