Instrument Package Manipulation Through the Generation and Use of an Attenuated-Fluent Gas Fold

This document discusses a technique that provides a means for suspending large, awkward loads, instrument packages, components, and machinery in a stable, controlled, and precise manner. In the baseplate of the test machine, a pattern of grooves and ports is installed that when pressurized generates an attenuated-fluent gas fold providing a low-cost, near-zero-coefficient-of-friction lubrication boundary layer that supports the object evenly, and in a predictable manner. Package movement control requires minimal force.

Aids to repeatable travel and positional accuracy can be added via the addition of simple guide bars and stops to the floor or object being moved. This allows easily regulated three-axis motions. Loads of extreme weight and size can be moved and guided by a single person, or by automated means, using minimal force. Upon removal of the attenuated-fluent gas fold, the object returns to a stable resting position without impact forces affecting the object.

This work was done by Daniel P. Breen of ASRC Aerospace for Glenn Research Center. Further information is contained in a TSP (see page 1).

Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steven Fedor, Mail Stop 4-A, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18739-1.

Lunar Reconnaissance Orbiter (LRO) Command and Data Handling Flight Electronics Subsystem

A document describes a high-performance, modular, and state-of-the-art Command and Data Handling (C&DH) system developed for use on the Lunar Reconnaissance Orbiter (LRO) mission. This system implements a complete hardware C&DH subsystem in a single chassis enclosure that includes a processor card, 48 Gbytes of solid-state recorder memory, data buses including MIL-STD-1553B, custom RS-422, SpaceWire, analog collection, switched power services, and interfaces to the Ka-Band and S-Band RF communications systems.

The C&DH team capitalized on extensive experience with hardware and software with PCI bus design, SpaceWire networking, Actel FPGA design, digital flight design techniques, and the use of VxWorks for the real-time operating system. The resulting hardware architecture was implemented to meet the LRO mission requirements.

This work was done by Quang Nguyen, William Yuknis, Noosha Haghani, Scott Pursley, and Omar Haddad of Goddard Space Flight Center. Further information is contained in a TSP (see page 1), GSC-16100-1.

Electro-Optic Segment-Segment Sensors for Radio and Optical Telescopes

A document discusses an electro-optic sensor that consists of a collimator, attached to one segment, and a quad diode, attached to an adjacent segment. Relative segment-segment motion causes the beam from the collimator to move across the quad diode, thus generating a measurable electric signal. This sensor type, which is relatively inexpensive, can be configured as an edge sensor, or as a remote segment-segment motion sensor.

This work was done by Alex Abramovic of Caltech for NASA’s Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1), NPO-47528.