



Books & Reports

Software-Defined Radio for Space-to-Space Communications

A paper describes the Space-to-Space Communications System (SSCS) Software-Defined Radio (SDR) research project to determine the most appropriate method for creating flexible and reconfigurable radios to implement wireless communications channels for space vehicles so that fewer radios are required, and commonality in hardware and software architecture can be leveraged for future missions. The ability to reconfigure the SDR through software enables one radio platform to be reconfigured to interoperate with many different waveforms. This means a reduction in the number of physical radio platforms necessary to support a space mission's communication requirements, thus decreasing the total size, weight, and power needed for a mission.

This work was done by Ken Fisher and Cindy Jih of Johnson Space Center, and Michael S. Moore, Jeremy C. Price, Ben A. Abbott, and Justin A. Fritz of Southwest Research Institute. Further information is contained in a TSP (see page 1). MSC-24465-1

Reflective Occultation Mask for Evaluation of Occulter Designs for Planet Finding

Advanced formation flying occulter designs utilize a large occulter mask flying in formation with an imaging telescope to block and null starlight to

allow imaging of faint planets in exosolar systems. A paper describes the utilization of subscale reflective occultation masks to evaluate formation flying occulter designs. The use of a reflective mask allows mounting of the occulter by conventional means and simplifies the test configuration.

The innovation alters the test set-up to allow mounting of the mask using standard techniques to eliminate the problems associated with a standard configuration. The modified configuration uses a reflective set-up whereby the star simulator reflects off of a reflective occulting mask and into an evaluation telescope. Since the mask is sized to capture all rays required for the imaging test, it can be mounted directly to a supporting fixture without interfering with the beam.

Functionally, the reflective occultation mask reflects light from the star simulator instead of transmitting it, with a highly absorptive carbon nanotube layer simulating the occulter blocking mask. A subscale telescope images the star source and companion dim source that represents a planet. The primary advantage of this is that the occulter can be mounted conventionally instead of using diffractive wires or magnetic levitation.

This work was done by John Hagopian, Richard Lyon, Shahram Shiri, and Patrick Roman of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-15943-1

Molecular Adsorber Coating

A document discusses a zeolite-based sprayable molecular adsorber coating that has been developed to alleviate the size and weight issues of current ceramic puck-based technology, while providing a configuration that more projects can use to protect against degradation from outgassed materials within a spacecraft, particularly contamination-sensitive instruments. This coating system demonstrates five times the adsorption capacity of previously developed adsorber coating slurries. The molecular adsorber formulation was developed and refined, and a procedure for spray application was developed. Samples were spray-coated and tested for capacity, thermal optical/radiative properties, coating adhesion, and thermal cycling.

Work performed during this study indicates that the molecular adsorber formulation can be applied to aluminum, stainless steel, or other metal substrates that can accept silicate-based coatings. The coating can also function as a thermal-control coating. This adsorber will dramatically reduce the mass and volume restrictions, and is less expensive than the currently used molecular adsorber puck design.

This work was done by Sharon Straka, Wanda Peters, Mark Hasegawa, Randy Hedgeland, and John Petro of Goddard Space Flight Center and Kevin Novo-Gradac, Alfred Wong, Jack Triolo, and Cory Miller of SGT, Inc. Further information is contained in a TSP (see page 1). GSC-16105-1