

turns on a circular form, are mounted orthogonally inside the non-metallic housing. The fiber-optic conversion module comprises three interferometers, one for each search coil. Each interferometer has a high bandwidth optical phase modulator that impresses the signal received from its search coil onto its output. The output of each interferometer travels by fiber optic cable to the avionics unit, and the search coil signal is recovered by an optical phase demodulator. The output of each demodulator is fed to an

analog-to-digital converter, whose sampling rate is determined by the maximum expected rate of rise and peak signal magnitude. The output of the digital processor is a faithful reproduction of the coil response to the incident magnetic field. This information is provided in a standard output format on a 50-ohm port that can be connected to any number of data collection and processing instruments and/or systems.

The measurement of magnetic fields using fiber-optic signal processing is

novel because it eliminates limitations of a traditional B-dot system. These limitations include the distance from the sensor to the measurement device, the potential for the signal to degrade or be corrupted by EMI from lightning, and the size and weight of the sensor and associated plate.

This work was done by Jay Gurecki of Kennedy Space Center; Bob Scully of Johnson Space Center; and Allen Davis, Clay Kirkendall, and Frank Bucholtz of the Naval Research Laboratory. Further information is contained in a TSP (see page 1). KSC-13221

Photocatalytic Active Radiation Measurements and Use

This technology can be used to improve the ability to predict the performance of photocatalytic materials under different illumination conditions.

Stennis Space Center, Mississippi

Photocatalytic materials are being used to purify air, to kill microbes, and to keep surfaces clean. A wide variety of materials are being developed, many of which have different abilities to absorb various wavelengths of light. Material variability, combined with both spectral illumination intensity and spectral distribution variability, will produce a wide range of performance results. The proposed technology estimates photocatalytic active radiation (PcAR), a unit of radiation that normalizes the amount of light based on its spectral distribution and on the ability of the material to absorb that radiation.

Photocatalytic reactions depend upon the number of electron-hole pairs generated at the photocatalytic surface. The number of electron-hole pairs produced depends on the number of photons per unit area per second striking the surface that can be absorbed and whose energy exceeds the bandgap of the photocatalytic material. A convenient parameter to describe the number of useful pho-

tons is the number of moles of photons striking the surface per unit area per second. The unit of micro-einsteins (or micromoles) of photons per m² per sec is commonly used for photochemical and photoelectric-like phenomena. This type of parameter is used in photochemistry, such as in the conversion of light energy for photosynthesis.

Photosynthetic response correlates with the number of photons rather than by energy because, in this photochemical process, each molecule is activated by the absorption of one photon. In photosynthesis, the number of photons absorbed in the 400–700 nm spectral range is estimated and is referred to as photosynthetic active radiation (PAR). PAR is defined in terms of the photosynthetic photon flux density measured in micro-einsteins of photons per m² per sec. PcAR is an equivalent, similarly modeled parameter that has been defined for the photocatalytic processes.

Two methods to measure the PcAR level are being proposed. In the first

method, a calibrated spectrometer with a cosine receptor is used to measure the spectral irradiance. This measurement, in conjunction with the photocatalytic response as a function of wavelength, is used to estimate the PcAR. The photocatalytic response function is determined by measuring photocatalytic reactivity as a function of wavelength. In the second method, simple shaped photocatalytic response functions can be simulated with a broad-band detector with a cosine receptor appropriately filtered to represent the spectral response of the photocatalytic material. This second method can be less expensive than using a calibrated spectrometer.

This work was done by Bruce A. Davis of Stennis Space Center and Robert E. Ryan and Lauren W. Underwood of Science Systems and Applications, Inc. Inquiries concerning the technology should be addressed to the Intellectual Property Manager, Stennis Space Center, (228) 688-1929. Refer to SSC-00328.

Computer Generated Hologram System for Wavefront Measurement System Calibration

NASA's Goddard Space Flight Center, Greenbelt, Maryland

Computer Generated Holograms (CGHs) have been used for some time to calibrate interferometers that require nulling optics. A typical scenario is the testing of aspheric surfaces with

an interferometer placed near the paraxial center of curvature. Existing CGH technology suffers from a reduced capacity to calibrate middle and high spatial frequencies. The root

cause of this shortcoming is as follows: the CGH is not placed at an image conjugate of the asphere due to limitations imposed by the geometry of the test and the allowable size of the CGH.