with different signals without the need to disassemble the instrument or connect and reconnect components, is a great advantage to the aft-optics test port. Another benefit is that the receiver telescope aperture is fully back-illuminated by the test port so the receiver telescope focal setting vs. pressure and or temperature can be accurately measured (as compared to schemes where the aperture is only partially illuminated). Fiber-optic coupling the test port also allows for the modularity of testing the receiver detectors with a variety of background and signal laser sources without the need of using complex optical set-ups to optimize the efficiency of each source.

This work was done by Luis Ramos-Izquierdo, V. Stanley Scott, Haris Riris, and John Cavanaugh of Goddard Space Flight Center. For further information, contact the Goddard Innovative Partnerships Office at (301) 286-5810. GCS-15890-1

Phase Retrieval System for Assessing Diamond Turning and Optical Surface Defects

Goddard Space Flight Center, Greenbelt, Maryland

An optical design is presented for a measurement system used to assess the impact of surface errors originating from diamond turning artifacts. Diamond turning artifacts are common by-products of optical surface shaping using the diamond turning process (a diamond-tipped cutting tool used in a lathe configuration).

Assessing and evaluating the errors imparted by diamond turning (including other surface errors attributed to optical manufacturing techniques) can be problematic and generally requires the use of an optical interferometer. Commercial interferometers can be expensive when compared to the simple optical setup developed here, which is used in combination with an image-based sensing technique (phase retrieval). Phase retrieval is a general term used in optics to describe the estimation of optical imperfections or "aberrations."

This turnkey system uses only image-based data and has minimal hardware requirements. The system is straightforward to set up, easy to align, and can provide nanometer accuracy on the measurement of optical surface defects.

This work was done by Bruce Dean, Alex Maldonado, and Matthew Bolcar of the Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-15976-1

Laser Oscillator Incorporating a Wedged Polarization Rotator and a Porro Prism as Cavity Mirror

Goddard Space Flight Center, Greenbelt, Maryland

A laser cavity was designed and implemented by using a wedged polarization rotator and a Porro prism in order to reduce the parts count, and to improve the laser reliability. In this invention, a z-cut quartz polarization rotator is used to compensate the wavelength retardance introduced by the Porro prism. The polarization rotator rotates the polarization of the linear polarized beam with a designed angle that is independent of the orientation of the rotator. This unique property was used to combine the retardance compensation and a Risley prism to a single optical component: a wedged polarization rotator. This greatly simplifies the laser alignment procedure and reduces the number of the laser optical components.

This work was done by Steven Li of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-15833-1