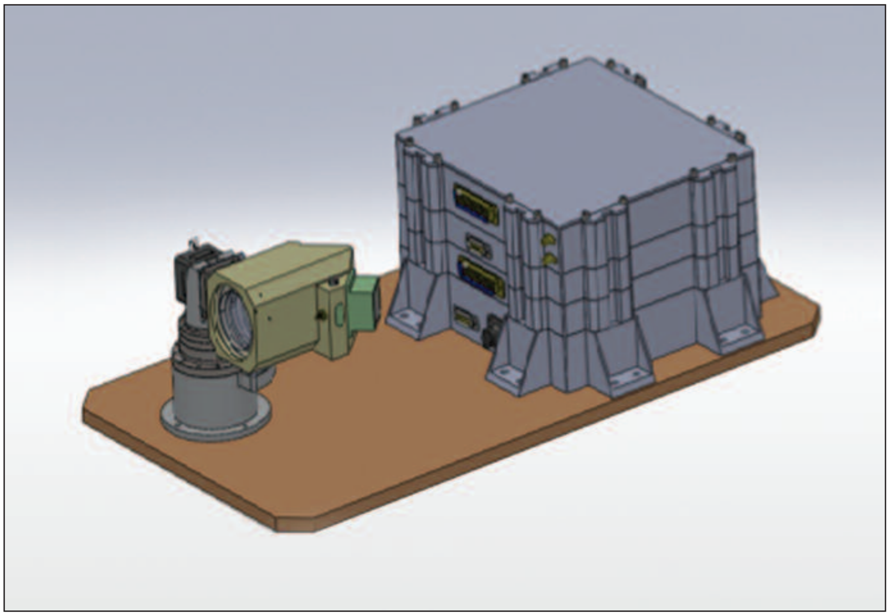

A **Laser Communications Terminal** consists of the optical head on a 2-axis gimbal (left), and an electronics/laser box (right).

able include laser transmit power at either end of the link, and telescope aperture diameter at each end of the link. Increased laser power is traded for smaller-aperture diameters.

5. Use of commercially available space-qualified or qualifiable components with traceability to flight qualification (i.e., a flight-qualified version is commercially available). An example is use of Telecordia-qualified fiber optic communication components including active components (lasers, amplifiers, photodetectors) that, except for vacuum and radiation, meet most of the qualifications required for space.
6. Use of CWDM technique at the flight transmitter for operation at four channels (each at 2.5 Gb/s or a total of 10 Gb/s data rate). Applying this technique allows utilization of larger active area photodetectors at the ground station. This minimizes atmospheric scintillation/turbulence induced losses on the received beam at the ground terminal.
7. Use of forward-error-correction and deep-interleaver codes to minimize atmospheric turbulence effects on the downlink beam.

Target mass and power consumption for the flight data transmitter system is less than 10 kg and approximately 60 W for the 400-km orbit (900-km slant range), and 12 kg and 120 W for the 2,000-km orbit (6,000-km slant range). The higher mass and power for the latter are the result of employing a higher-power laser only.

This work was done by Joseph M. Kovalik, Hamid Hemmati, Abhijit Biswas, and William T. Roberts of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-48413

Application Program Interface for the Orion Aerodynamics Database

Lyndon B. Johnson Space Center, Houston, Texas

The Application Programming Interface (API) for the Crew Exploration Vehicle (CEV) Aerodynamic Database has been developed to provide the developers of software an easily implemented, fully self-contained method of accessing the CEV Aerodynamic Database for use in their analysis and simulation tools. The API is programmed in C and provides a series of functions to interact with the database, such as initialization, selecting various options, and calculating the aerodynamic data. No special functions (file read/write, table lookup) are required on the host system other than those included with a standard ANSI C installation. It reads one or more files of aero data tables.

Previous releases of aerodynamic databases for space vehicles have only included data tables and a document of the algorithm and equations to combine them for the total aerodynamic forces and moments. This process required each software tool to have a unique implementation of the database code. Errors or omissions in the documentation, or errors in the implementation, led to a lengthy and burdensome process of having to debug each instance of the code. Additionally, input file formats differ for each space vehicle simulation tool, requiring the aero database tables to be reformatted to meet the tool's input file structure requirements. Finally, the capabilities for built-in table lookup routines vary for each simulation tool. Implementation of a new database may require an update to and verification of the table lookup routines. This may be required if the number of dimensions of a data table exceeds the capability of the simulation tool's built-in lookup routines.

A single software solution was created to provide an aerodynamics software model that could be integrated into other simulation and analysis tools. The highly complex Orion aerodynamics model can then be quickly included in a wide variety of tools. The API code is written in ANSI C for ease of portability to a wide variety of systems. The input data files are in standard formatted ASCII, also for improved portability.

The API contains its own implementation of multidimensional table reading and lookup routines. The same aerodynamics input file can be used without modification on all implementations. The turnaround time from aerodynamics model release to a working implementation is significantly reduced.

This work was done by Philip E. Robinson and James Thompson of Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-24819-1