Technology Focus: Data Acquisition

Flight Test Results from the Rake Airflow Gage Experiment on the F-15B

The primary goal is to identify the relationship between free stream and local mach number in the low supersonic regime.

Dryden Flight Research Center, Edwards, California

The results are described of the Rake Airflow Gage Experiment (RAGE), which was designed and fabricated to support the flight test of a new supersonic inlet design using Dryden's Propulsion Flight Test Fixture (PFTF) and F-15B testbed airplane (see figure). The PFTF is a unique pylon that was developed for flight-testing propulsion-related experiments such as inlets, nozzles, and combustors over a range of subsonic and supersonic flight conditions.

The **NASA Dryden F-15B** research test bed with Propulsion Flight Test Fixture pylon and Rake Airflow Gage Experiment rake during flight test.

The objective of the RAGE program was to quantify the local flowfield at the aerodynamic interface plane of the Channeled Centerbody Inlet Experiment (CCIE). The CCIE is a fixed representation of a conceptual mixed-compression supersonic inlet with a translating biconic centerbody. The primary goal of RAGE was to identify the relationship between free-stream and local Mach number in the low supersonic regime, with emphasis on the identification of the particular free-stream Mach number that produced a local Mach number of 1.5. Measurements of the local flow angularity, total pressure distortion, and dynamic pressure over the interface plane were also desired.

The experimental data for the RAGE program were obtained during two separate research flights. During both flights, local flowfield data were obtained during straight and level acceleration segments out to steady-state test points. The data obtained from the two flights showed small variations in Mach number, flow angularity, and dynamic pressure across the interface plane at all flight conditions. The data show that a free-stream Mach number of 1.65 will produce the desired local Mach number of 1.5 for CCIE. The local total pressure distortion over the interface plane at this condition was approximately 1.5%. At this condition, there was an average of nearly 2° of downwash over the interface plane. This small amount of downwash is not expected to adversely affect the performance of the CCIE inlet.

This work was done by Michael Frederick and Nalin Ratnayake of Dryden Flight Research Center. Further information is contained in a TSP (see page 1). DRC-009-018

Telemetry and Science Data Software System

Goddard Space Flight Center, Greenbelt, Maryland

The Telemetry and Science Data Software System (TSDSS) was designed to validate the operational health of a spacecraft, ease test verification, assist in debugging system anomalies, and provide trending data and advanced science analysis. In doing so, the system parses, processes, and organizes raw data from the Aquarius instrument both on the ground and while in space. In addition, it provides a user-friendly telemetry viewer, and an instant push-button test report generator. Existing ground data systems can parse and provide simple data processing, but have limitations in advanced science analysis and instant report generation.

The TSDSS functions as an offline data analysis system during I&T (integration and test) and mission operations phases. After raw data are downloaded from an instrument, TSDSS ingests the data files, parses, converts telemetry to engineering units, and applies advanced algorithms to produce science level 0, 1, and 2 data products. Meanwhile, it automatically schedules upload of the raw data to a remote server and archives all intermediate and final values in a MySQL database in time