being developed to utilize the information and provide input on the residual strength of the structure, and maintain a history of structural degradation during usage. The structural health-monitoring system would consist of three major components: (1) sensors and a sensor network, which is permanently bonded onto the structure being monitored; (2) integrated hardware; and (3) software to monitor in-situ the health condition of in-service structures.

This work was done by Xinlin P. Qing, Christopher Aquino, and Amrita Kumar of Acellent Technologies, Inc. for Glenn Research Center.

Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steve Fedor, Mail Stop 4-8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18396-1.
response from at least three sensors in contact with the liquid. When internal baffles are used, the surface is that of a plane with fluid perturbations about the plane. When successive fuel-level readings are acquired and averaged, the results will approximate that of a plane. Once this surface is known, it can be used with the tank geometry to determine the volume under the surface.

Solely capacitive sensors are directly connected to power source and interrogation equipment. They must be calibrated for all capacitance in the sensor and the electrical wires to the sensor, making it necessary to have the sensor electronics near or at the probe because lead length affects the capacitance of the probe. The magnetic field response sensor system presented provides an added logistical advantage in that electrical leads do not affect their calibration. Each sensor can easily be calibrated by taking the response frequency when the tank is empty, then again when the tank is full. One can then easily determine the sensor response with respect to the fractional fluid level without the need for additional measurements, and therefore know the fractional level (e.g., 0.1 full) without knowing the fluid dielectric, sensor material, sensor geometry, or tank geometry.

With the advent of vehicle engines using many different types of fuels with each having a different dielectric, it is advantageous for a measurement system that can easily be calibrated for any fluid without having to take the vehicle to a maintenance facility.

This work was done by Stanley E. Woodard of Langley Research Center and Bryant D. Taylor of ATK Space Division. Further information is contained in a TSP (see page 1). LAR-17116-1