ratus, such that the volume of solution needed for each analysis is of the order of microliters and the mass of protein needed for each analysis at typical concentrations is of the order of micrograms.

The capability of the improved apparatus to yield measurements from which accurate B_{22} values could be calculated was demonstrated in experiments on several different aqueous lysozyme and concanavalin A solutions for which B_{22} values had been determined by other means. The apparatus has also been used to screen a series of potential crys albumin, and to evaluate B_{22} as an indication of the solubility of proteins.

This work was done by Wilbur Wilson, Joseph Fanguy, Steven Holman, and Bin Guo of Mississippi State University for Marshall Space Flight Center. Further information is contained in a TSP (see page 1).
MFS-32536-1

Measurements by a Vector Network Analyzer at 325 to 508 GHz

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Recent experiments were performed in which return loss and insertion loss of waveguide test assemblies in the frequency range from 325 to 508 GHz were measured by use of a swept-frequency two-port vector network analyzer (VNA) test set. The experiments were part of a continuing effort to develop means of characterizing passive and active electronic components and systems operating at ever increasing frequencies. The waveguide test assemblies comprised WR-2.2 end sections collinear with WR-3.3 middle sections. The test set, assembled from commercially available components, included a 50-GHz VNA scattering-parameter test set and external signal synthesizers, augmented with recently developed frequency extenders, and further augmented with attenuators and amplifiers as needed to adjust radio-frequency and intermediate-frequency power levels between the aforementioned components.

The tests included line-reflect-line calibration procedures, using WR-2.2 waveguide shims as the "line" standards and waveguide flange short circuits as the "reflect" standards. Calibrated dynamic ranges somewhat greater than about 20 dB for return loss and 35 dB for insertion loss were achieved. The measurement data of the test assemblies were found to substantially agree with results of computational simulations.

This work was done by King Man Fung, Lorene Samoska, Goutam Chattopadhyay, Todd Gaier, Pekka Kangaslahti, David Pukala, Yuenie Lau, Charles Oleson, and Anthony Denning of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-44694