sets generated by inverse design and optimization computer programs. All of the smoothing results show that CFACS is able to generate unbiased smooth fits of curvature profiles, trading small modifications of geometry for increasing curvature smoothness by eliminating curvature oscillations and bumps (see figure).

This work was done by W. Li and S. Krist of Langley Research Center. Further information is contained in a TSP (see page 1). LAR-17227-1

Reducing Spaceborne-Doppler-Radar Rainfall-Velocity Error

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A combined frequency-time (CFT) spectral moment estimation technique has been devised for calculating rainfall velocity from measurement data acquired by a nadir-looking spaceborne Doppler weather radar system. Prior spectral moment estimation techniques used for this purpose are based partly on the assumption that the radar resolution volume is uniformly filled with rainfall. The assumption is unrealistic in general but introduces negligible error in application to airborne radar systems. However, for spaceborne systems, the combination of this assumption and inhomogeneities in rainfall [denoted non-uniform beam filling (NUBF)] can result in velocity measurement errors of several meters per second.

The present CFT spectral moment estimation technique includes coherent processing of a series of Doppler spectra generated in a standard manner from data over measurement volumes that are partially overlapping in the along-track direction. Performance simulation of this technique using high-resolution data from an airborne rain-mapping radar shows that a spaceborne Ku-band Doppler radar operating at signal-to-noise ratios >10 dB can achieve root-mean-square accuracy between 0.5 and 0.6 m/s in vertical-velocity estimates.

This work was done by Simone Tanelli, Eastwood Im, and Stephen L. Durden of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-40590