

Sensitivity of Optical Metrology Calibration to Measured Corner Cube Retroreflector Parameters for Space Interferometry Mission

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Picometer scale optical metrology specifications for the Space Interferometry Mission require precision calibration functions involving the optical and orientation characteristics of corner cube retroreflectors. Accurate knowledge of such parameters as the index of refraction of the reflective coating, dihedral between facets, and the orientation of the retroreflector with respect to the interrogating metrology beam and its polarization state is critical. Knowledge errors result in optical path differences that are shown to be on the order of nanometers. These sensitivities are determined from Zemax-generated models and measured parameters. Due the stringent requirements of SIM, accurate and consistent experimental measurements of corner cube characteristics are required for improved calibration of mission metrology systems. Initial dihedral measurements to within 0.05 arcsecond and refractive indices to within 1% are obtained and integrated into the models.

KEY WORDS:

Interferometry, Metrology, Corner Cube, Retroreflector, Dihedral, Space Interferometry Mission, SIM