

Specifically, the filter has a clear aperture of about 51 mm.

The optical design is refractive, and is comprised of nine custom refractive elements and an interference filter. The restricted maximum angle through the narrow-band filter ensures the efficient

use of a 2-nm noise equivalent bandwidth spectral width optical filter at low elevation angles (where the range is longest), at the expense of less efficiency for high elevations, which can be tolerated because the range at high elevation angles is shorter. The image circle is 12

mm in diameter, mapped to $80 \times 360^\circ$ of sky, centered on the zenith.

This work was done by Norman A. Page, Jeffrey R. Charles, and Abhijit Biswas of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-46945

Extracting Zero-Gravity Surface Figure of a Mirror

NASA's Jet Propulsion Laboratory, Pasadena, California

The technical innovation involves refinement of the classic optical technique of averaging surface measurements made in different orientations with respect to gravity, so the effects of gravity cancel in the averaged image. Particularly for large, thin mirrors subject to substantial deformation, the further requirement is that mount forces must also cancel when averaged over measurement orientations. The zero-gravity surface figure of a mirror in a hexapod mount is obtained by analyzing the summation of mount forces in

the frame of the optic as surface metrology is averaged over multiple clockings. This is illustrated with measurements taken from the Space Interferometry Mission (SIM) PT-M1 mirror for both twofold and threefold clocking. The positive results of these measurements and analyses indicate that, from this perspective, a lighter mirror could be used; that is, one might place less reliance on the damping effects of the elliptic partial differential equations that describe the propagation of forces through glass.

The advantage over prior art is relaxing the need for an otherwise substantial thickness of glass that might be needed to ensure accurate metrology in the absence of a detailed understanding and analysis of the mount forces. The general insights developed here are new, and provide the basic design principles on which mirror mount geometry may be chosen.

This work was done by Eric E. Bloemhof, Jonathan C. Lam, V. Alfonso Fera, and Zensheu Chang of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-47259