S4.04  Optics Manufacturing and Metrology for Telescopes

Lead Center: GSFC

Participating Center(s): JPL, MSFC

This subtopic focuses on optics manufacturing, metrology of optical surfaces, and mitigation of optical surface errors through direct manipulation of the optical surface and/or wavefront sensing and control techniques and technologies.

Optics manufacturing includes all areas associated with generation and maintenance of the optical surface, including both mirror and grating surfaces (and volumes). Improvements in substrate materials, hybrid structures, replication from masters, lightweighting techniques, and figuring and polishing (especially near-edge for segmented optics) are all sought.

Metrology of optical surfaces includes test methods and hardware to measure the surface to fractional wave tolerance, especially for large, aspheric optics and/or while the part is still mounted on the figuring/polishing apparatus or spindle. Metrology systems with artificial intelligence that can deterministically feed back to the polishing instrument, e.g., with a map of dwell times for subaperture polishing.

Mitigation of optical surface errors includes phase retrieval and wavefront sensing and control techniques and instrumentation, optical systems with high-precision controls, active and/or adaptive mirrors, shape control of deformable telescope mirrors, and image stabilization systems.