Thermal testing of a stacked core mirror for UV applications

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ABSTRACT

The ASTRO2010 Decadal Survey stated that an advanced large-aperture ultraviolet, optical, near-infrared (UVOIR) telescope is required to enable the next generation of compelling astrophysics and exoplanet science; and, that present technology is not mature enough to affordably build and launch any potential UVOIR mission concept. Under Science and Technology funding, NASA's Marshall Space Flight Center and ITT Exelis have developed a more cost effective process to make 4m monolithic spaceflight UV quality, low areal density, thermally and dynamically stable primary mirrors. A proof of concept mirror was built and tested down to 250K which would allow imaging out to 2.5 microns. This mirror was thermally tested at the Marshall Spaceflight Center to understand the thermal changes between the processing temperature of 293K and the potential low end of the operational temperature of 250K. Isothermal testing results and front plate gradient results have been evaluated and compared to analysis predictions. Measurement of gravity effects on surface figure will be compared to analytical predictions. Future testing of a larger Pathfinder mirror will also be discussed.