Gravity Sag Test Tower

Gravity sag is the effect on optical surfaces due to gravity. Additionally, optics manufactured in a gravitational field are made with inherent stresses built in. When these optics are flown in space those stresses release. We call this effect gravity release or “G-release”. To characterize the 0-G shape of optics, theory provides two methods: n-rotation test and face-up/face-down test.

Example of data taken from an n-rotation test

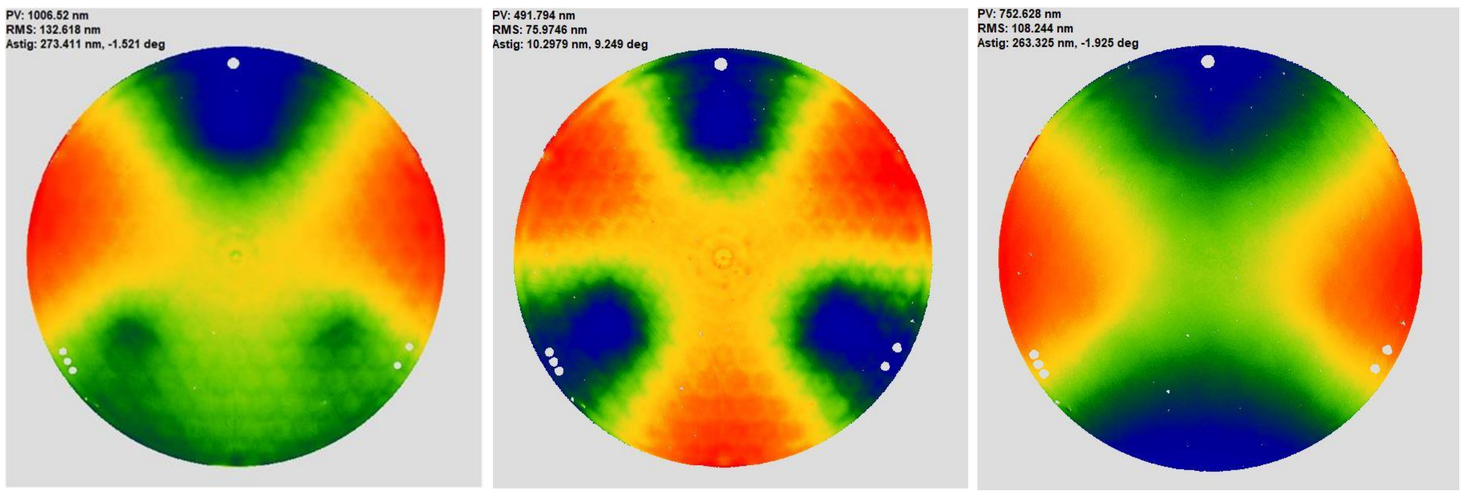

Figure 1: Left phase map is of an unprocessed measurement from the 4D interferometer. The middle phase map is of the 0-G surface of the mirror under test. The right phase map is of the gravity sag of the phase map on the left.

To accommodate mirrors up to 2 meters in diameter a gravity sag test tower was funded and is in the process of being assembled. The tower will allow for gravity sag rotation tests to be compared with face-up/face-down tests. This will allow additional model correlation to be done to predict gravity backout and to test null polished mirrors

Lis, Tomasz, Stephen Cheney, and H. Philip Stahl. "Absolute characterization of gravity sag for light-weighted optics." *Optical Manufacturing and Testing XIV*. Vol. 12221. SPIE, 2022.

H. Philip Stahl "Absolute characterization of gravity sag", Proc. SPIE 11487, Optical Manufacturing and Testing XIII, 114871F (20 August 2020); https://doi.org/10.1117/12.2568795