High Spatial and Temporal Frequency Active Surfaces for Diffraction Controlled Telescopes

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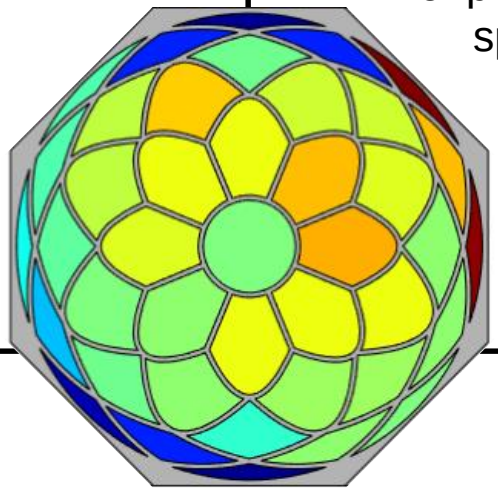
Research Objectives

- Develop primary mirror wavefront control scheme to reduce the effects of misalignments and pupil discontinuities on PSFs.
- Develop distributed in-situ sensing and control of primary mirror figure errors induced by spacecraft vibration and jitter sources.



Optimized actuator pattern

Approach

- Optimize actuator patterns and control schemes to manipulate diffraction peaks due to aperture discontinuities and system alignment errors.
- Develop a self-sensing active layer to detect the high frequency signal induced by deformation of PZT.
- Drive the active layer at high speed to cancel vibration errors.

Potential Impacts

- Lower cost, lightweight primary mirrors
- A key step toward enabling prime focus coronagraphs with reduced optical complexity and higher transmittance as identified in the Exoplanet Technology Plan (2016).