Piston sensing using multi-shot coded aperture complex wavefront sensing

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Abstract

Co-phasing is a challenge that arises when real or apparent discontinuities from either segmented mirrors or secondary spiders produce piston phase differences between pupil patches, which are not easily detectable from traditional wavefront sensors. In this work, we propose the use of a multi-shot complex field wavefront sensor technique that can sense piston differences from segmented mirrors. From a series of coded aperture intensity images, we can use phase retrieval to estimate not only phase variations within the pupil, but also abrupt discontinuities derived from piston differences. We show preliminary experimental results with different levels of segmented aperture pistons, as we are adapting the technique to provide with real-time estimations.

Keywords: Cophasing, Segmented mirrors, Wavefront Sensor, Piston Detection.

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