Virtual Deflectometry Enclosure Screen

**Title:** Virtual Deflectometry Enclosure Screen

**Invention:** This invention addresses the above shortcomings of existing deflectometry systems and provides simple and compact, yet accurate, deflectometry devices, methods, and systems that can be feasibly implemented for measuring optical components having arbitrary shapes and surface characteristics, including flat and/or highly convex optical components. The disclosed techniques can enable a $2\pi$-steradian measurement range (i.e., a half-sphere) and a $4\pi$-steradian measurement range.

**Background:** Deflectometry is a non-null test method which has been shown to provide surface metrology accuracy similar to commercial interferometry systems. While existing interferometric and deflectometry techniques may be feasibly implemented for measuring concave and/or small objects, they become prohibitively expensive and even impossible for convex optics, both standard in shape, as well as freeform. Interferometric approaches, swing arm profilometry, and the Hindle test, for example, typically require measuring sub-apertures of the unit, which are then ‘stitched’ together. However, having an interferometric setup and the required null optic is not always a viable option.

**Advantages:**

- Easy to construct
- Measures surface profiles for flats, concave, freeform, and highly convex surfaces
- Can achieve $2\pi$ and $4\pi$ steradian coverage

**Applications:**

- Optical metrology

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**Contact** Amy Phillips  
Sr. Licensing Manager  
amyp@tla.arizona.edu  
(520) 621-9579

The University of Arizona, Tucson, Arizona
Contact: Amy Phillips
amyp@tlia.arizona.edu

Refer to case number U19-136

Inventors

Logan Graves
Graduate Student, Optical Sciences

Dae Wook Kim
Assistant Professor, Optical Sciences