

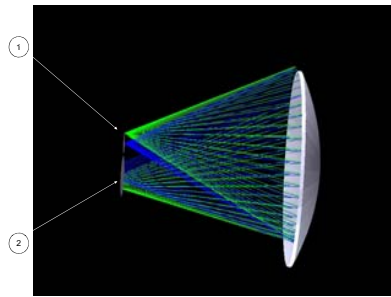
# Testing a Full Aperture f/0.4 Solar Dish

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A new technique to map surface slope over a large diameter, aspheric solar mirrors has been developed. In the test a moving light source and a camera are located near the center of curvature of the mirror. Images of the mirror taken by the camera are recorded to show reflections from the mirror for different positions of the light source. As each point on the mirror is seen to reflect the source, its surface slope is determined from the relative positions of the camera and the source, from Snell's law of reflection. In the experimental test illustrated below, a raster of illuminated pixels on a computer LCD screen provides the moving source to measure the surface of a segment of an f/0.5 paraboloid. The technique will shortly be used to test a full aperture 3 m reflector.

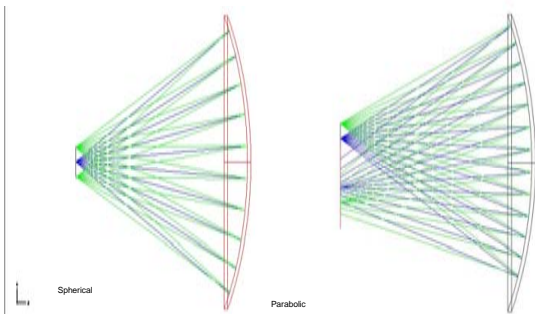
Computer screen is aligned at Center of Curvature

Optical layout of the test

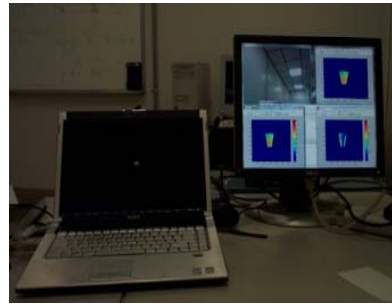


Only Beams from a specific region of the field will intersect a region of the Image Plane

A point source at the center of curvature of a spherical mirror will image back at the source. This is not true for aspheric mirrors.

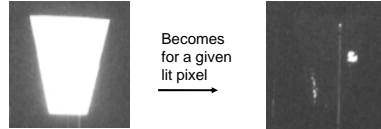


Test Setup requires LCD Screen and Webcam



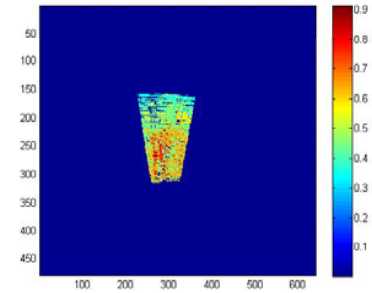
The Laptop screen contains a 2MP webcam in the bezel. A second Screen is added to monitor the test while in progress. During the test, a rectangular patch rasters across the laptop screen.

Each spot on the screen will light a portion of the mirror

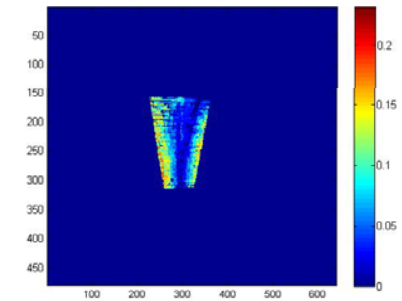


Alignment is done by turning on the entire screen and moving the laptop and mirror until the entire surface is lit. As the array scans it computes the given slope error based on which portion of the mirror lights versus which pixel should have lit. The entire scan takes 10 minutes to complete a 1000 point array.

Slope Errors Are Described as an RSS Deviation from an Ideal Sphere



Y Slope Error (Radians)



X Slope Error (Radians)

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