

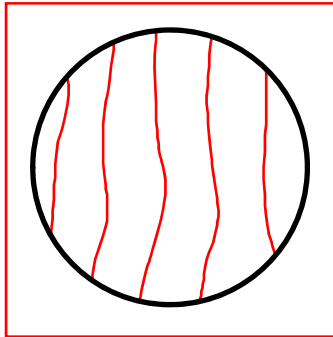
4.8 Classical Techniques for Getting Data into the Computer

- Elementary analysis of interferograms
- Computer analysis of interferograms

Typical Interferogram



Surface Error =
 $(\lambda/2) (\Delta/S)$



Classical Analysis

Measure positions of fringe centers.

Deviations from straightness and equal spacing gives aberration.

Elementary Interferogram Analysis



- Estimate peak to valley (P-V) by looking at interferogram.
- Dangerous to only estimate P-V because one bad point can make optics look worse than it actually is.
- Better to use computer analysis to determine additional parameters such as root-mean-square (RMS).

Computer Analysis of Interferograms



Largest Problem

Getting interferogram data into
computer

Solutions

- Graphics Tablet
- Scanner
- CCD Camera
- Phase-Shifting Interferometry

Digitization



Automatic Interferogram Scanner



One solution

Video system and computer automatically finds locations of two sides of interference fringe where intensity reaches a given value.

Fringe center is average of two edge locations.

Computer Analysis Categories



Determination of what is wrong with optics being tested and what can be done to make the optics better.

- **Determination of performance of optics if no improvement is made.**

Minimum Capabilities of Interferogram Analysis Software



- **RMS and P-V**
- **Removal of desired aberrations**
- **Average of many data sets**
- **2-D and 3-D contour maps**
- **Slope maps**
- **Spot diagrams and encircled energy**
- **Diffraction calculations - PSF and MTF**
- **Analysis of synthetic wavefronts**