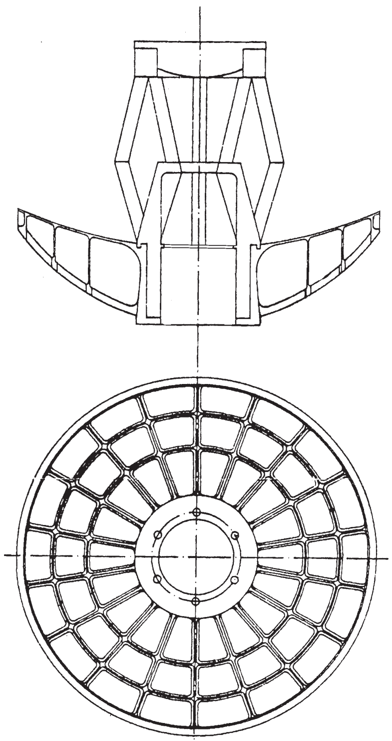
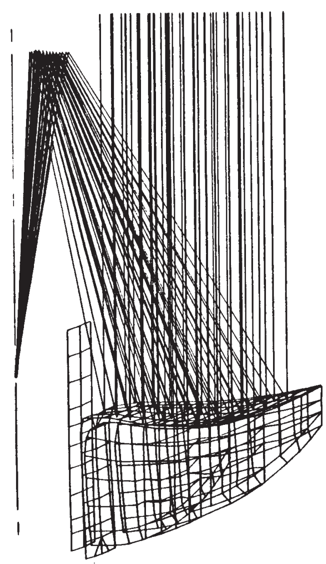
Optically Guided Ordnance



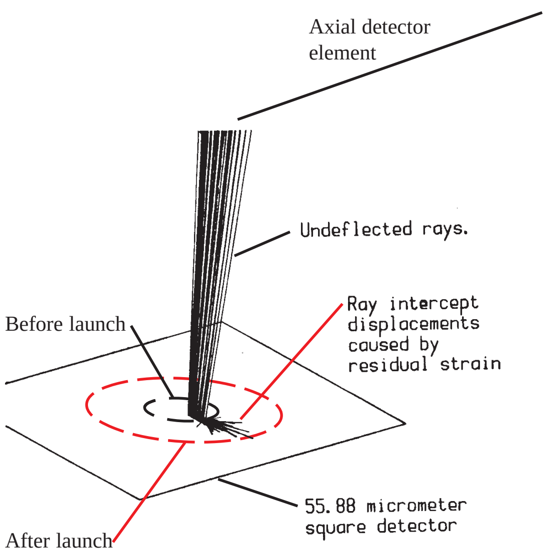
Telescope design

Optical Analog™ modeling techniques were used in a **Unified Analysis™** of an all-beryllium telescope designed for use in guided munitions. The telescope was required to operate after exposure to 100,000 gs initial acceleration (launch). Plastic yielding of the beryllium had to be sufficiently small that the after-launch spot size was small with respect to the detector elements on the focal plane assembly.

Cylindrical symmetry permitted the finite element model to be a 20° sector of the telescope. **The Optical Analog** was used to incorporate 44 optical rays into the sector, all controlled by the optical law of reflection at the mirror surfaces. The **Optical Analog** was used to calculate the after-launch radius of the blur circle on the detector element at the optical axis.



Unified analysis model



The rms radius of the blur circle was used with the Design Sensitivity Analysis (DSA) routines of the finite element code to minimize the mass of the primary mirror. Nonlinear finite element methods were used to predict the residual strains after launch.

Optical Analog techniques in a **Unified Analysis** environment provided reliable prediction of the after-launch image quality (spot size).

Alson E. Hatheway Incorporated

voice and fax: (626) 791-2243, e: aeh@aehinc.com

93979d1.pmd(2