

## Foucault's Knife Edge and Ronchi Test

**Background:** Review OPTI 515R notes and slides on the Knife Edge and Ronchi Tests Section 3.2 of <http://www.visualopticslab.com/OPTI515R/Notes/Section3Notes.pdf> and <http://www.visualopticslab.com/OPTI515R/Notes/Section3Slides.pdf>

**Introduction:** Foucault's Knife Edge Test and the Ronchi test are two simple and inexpensive techniques for assessing the aberrations in an optical system. They are typically used for examining telescope mirrors, but can be used in transmissive systems too. The basic concept is to block a portion of rays coming from the exit pupil with a mask and observe the "shadow" of the mask in the exit pupil. In the Knife edge test, as the name implies, the mask is a straight edge being opaque on one side and transparent on the other side. With the Ronchi test, the mask is a Ronchi ruling of alternating opaque and transmissive regions.

### Mirror System

1. Set of the knife edge and light source near the center of curvature of the concave mirror.
2. Record the knife edge patterns for different axial positions and different distances of the knife edge from the optical axis.
3. Replace the knife edge with the Ronchi ruling. Make sure the orientation of the Ronchi ruling is the same as the knife edge. Record the patterns for different axial positions of the Ronchi ruling. How are the knife edge and Ronchi patterns related?
4. Blow compressed air in the region between the mirror and the mask. How is the pattern affected?

Why did we place the masks at the center of curvature of the mirror?

### Singlet Lens

5. Set up a point source and a singlet lens. Tilt the singlet to induce coma and astigmatism. Place the knife edge near the paraxial focus of the lens.
6. Record the knife patterns as before.
7. Repeat for the Ronchi ruling.