Lab 2: Lenses

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Lab Section: 3

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1 Objective

We measured the image distance and object distance for a converging lens to determine the focal length of the lens.

2 Theory

Thin lens equation:

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \tag{1}$$

This was from Physics of Light and Optics by Peatross and Ware equation 7.4.3 [1, p. 230].

However, our lab manual uses the following version:

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \tag{2}$$

Below is an picture of the lab manual showing the variables used in the thin lens equation.

We wanted to use an estimate of the focal length before actually measuring the image distance and object distance. If the focal length is not too large and the image distance is large compared to the object distance, the focal lenght and image distance should be similar.

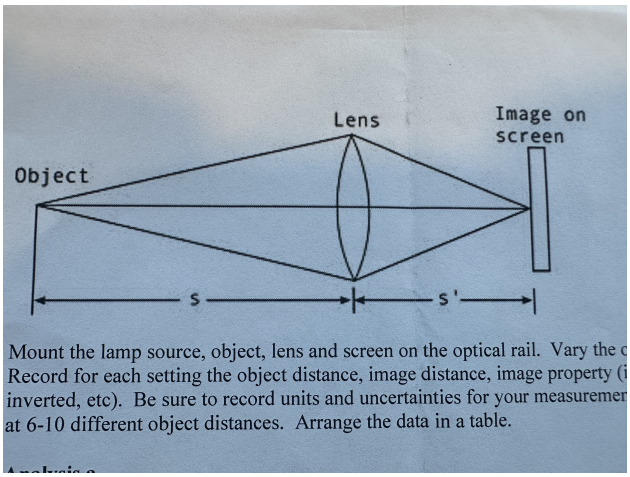

Figure 1: This image shows the variables used in the thin lens equation.

Uncertainty in a Function of Several Variables

$$\delta q = \sqrt{(\frac{\partial q}{\partial x}\delta x)^2 + ... + (\frac{\partial q}{\partial z}\delta z)^2} \tag{3}$$

This was from An Introduction to Error Analysis by John R. Taylor equation 3.47 [2, p. 75].

3 Experimental Procedure

4 Experimental Results and Analysis

5 Conclusions

References

[1] Justin Peatross and Michael Ware. *Physics of Light and Optics*. Brigham Young University, 2015.

[2] John R. Taylor. *An Introduction to Error Analysis: The study of uncertainties in physical measurements*. University Science Books, 1997.