EXPERIMENT.3

THIN EDGES LENS

Goal: Finding focus of thin edges lens

Theory:

Transparent media at least one surface of it is spherical is called lens. If edges according to the middle of the lens are thin, it is called thin edges lens. Otherwise edges according to the middle of the lens are thick, it is called thick edges lens. Some definitions on lens are described in the figure 1.

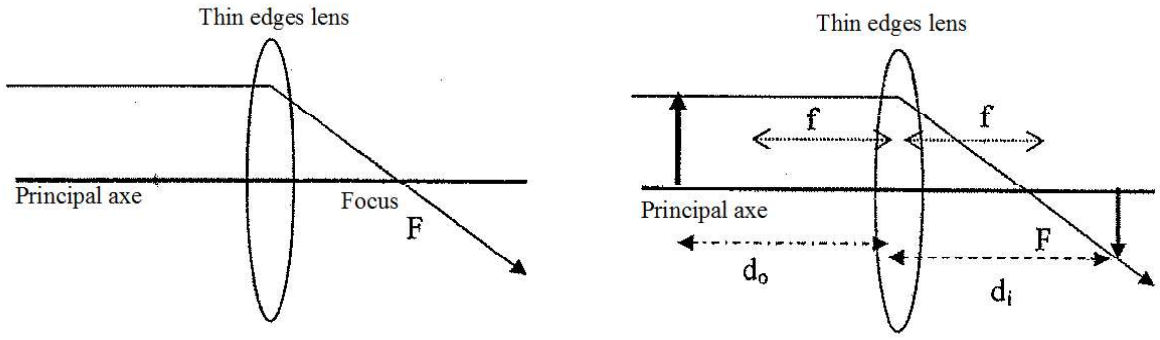

Figure 3.1

f; focus of lens, d_o and d_i; the distance of image and object from the lens, h_o and h_i heights of image and object, respectively. Between these quantities there are two relations;

$$\frac{1}{f}=\frac{1}{d_0}+\frac{1}{d_i} \quad (1)$$

$$\frac{h_i}{h_o}=\frac{d_i}{d_o}=m \quad (2)$$

Several d_o-d_i values pair can be obtained by changing the location of object. If graph $1/d_o$ against to $1/d_i$ is drawn, points intersect the horizontal and vertical axes of the graph give the values of f.

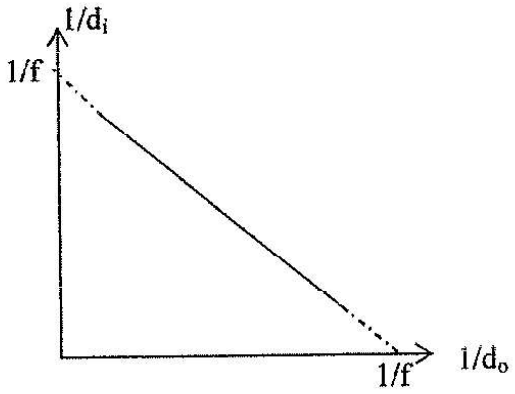

Figure 3.2. Graph $1/d_o$ against to $1/d_i$

Experimental Setup:

Apparatus:

1.) Light source
2.) Thin edges lens
3.) Screen
4.) Ruler
5.) Paper tape

EXPERIMENTAL SETUP AND MEASUREMENTS:

1.) A long strip of paper is placed on table.

2.) Keep away candle from the lens as it could be. And mark the location of the clear image and the object. Then write them to table 1.

3.) Change the location of the thin edges lens and write d_o-d_i values to table 1 by getting a clear image again on the screen.

4.) Repeat this process at least ten times.

Measurements:

n	d_o(cm)	d_i(cm)	1/ d_o (1/cm)	1/ d_i (1/cm)	(d_i/d_o)=m	f (cm)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Calculations:

1.) By using formula (1), calculate the focus of thin edges lens mathematically that used in this experiment.

2.) Use ten different measuring results, plot $1/d_o$ against to $1/d_i$ and find the focus of thin edges lens by using graph intersects the axes.

3.) Do the error calculation by comparing theoretical and experimental value of focus.

4.) Calculate the maximum relative error in any measurement from formula (1).

5.) Find the average standard deviation by using calculated f values.

6.) Write error causes in order.

7.) Write the results and comments about experiment via obtained data.

8.) Interpret your conclusions.

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