

Physics 319

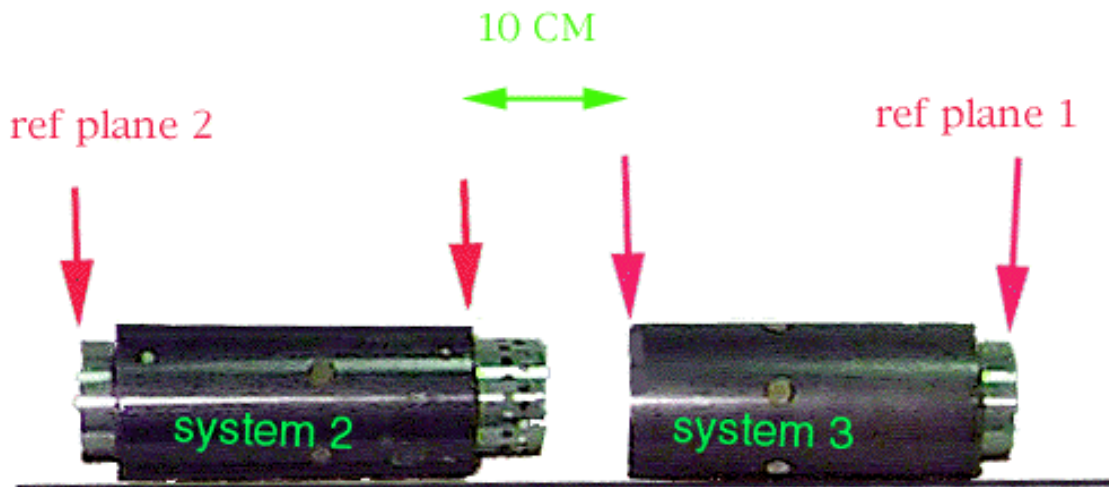
Lab Exercise

Matrix Methods for Optical Systems

Part 3: Combining Two systems

Systems #2 and #3 can be positioned as shown in the figure below. This will bring the reference plane #2 of system #3 to the same location as reference plane #1 of system #2. We can find the system matrix of the combined system by multiplying the two individual system matrices you have already measured:

$$\begin{matrix} A & B \\ C & D \end{matrix} = \begin{matrix} A_2 & B_2 & 1 & d \\ C_2 & D_2 & 0 & 1 \end{matrix} \begin{matrix} A_3 & B_3 \\ C_3 & D_3 \end{matrix}$$



where d is 10 cm.

Fill in the values below:

A=

B=

C=

D=

Now find the location of the principal planes, they can be determined from the matrix elements you have just calculated.

r=

s=

Put the system on the optical bench along with the source lamp and a screen as pictured above. Verify the thin lens equation for at least 3 different image distances (remember to measure from the principal planes).

S	predicted S'	measured S'
_____	_____	_____
_____	_____	_____
_____	_____	_____