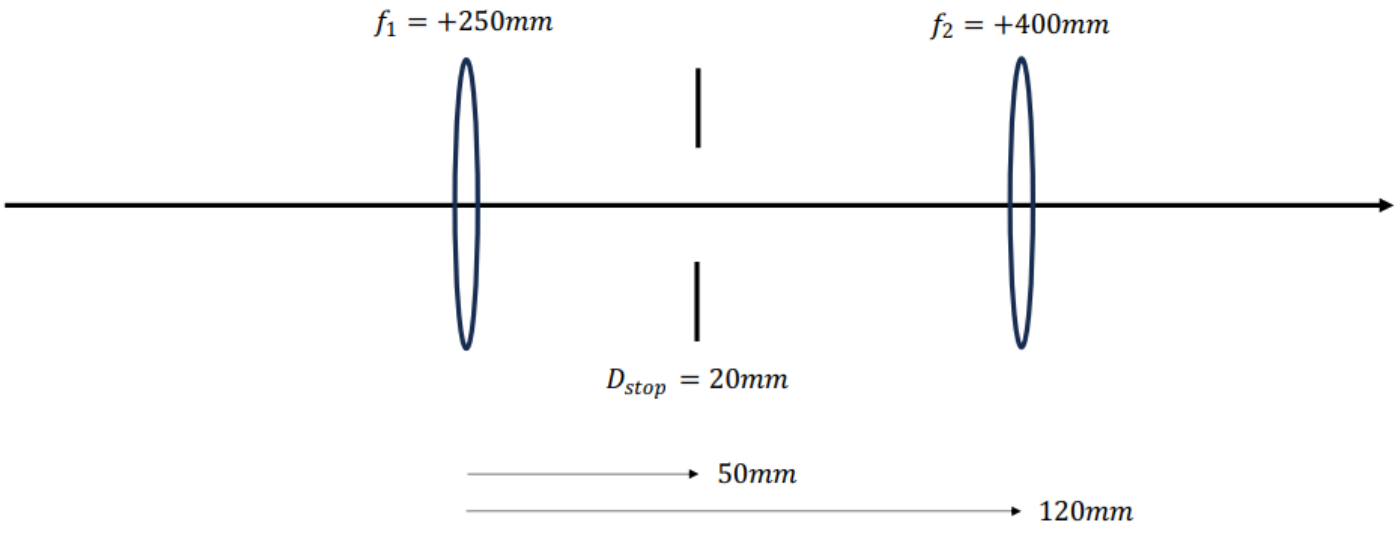
1. Pupil Location

First using (a) paraxial raytrace methods, then using (b) Gaussian methods, determine the location and size of the entrance and exit pupils for the following system in air.

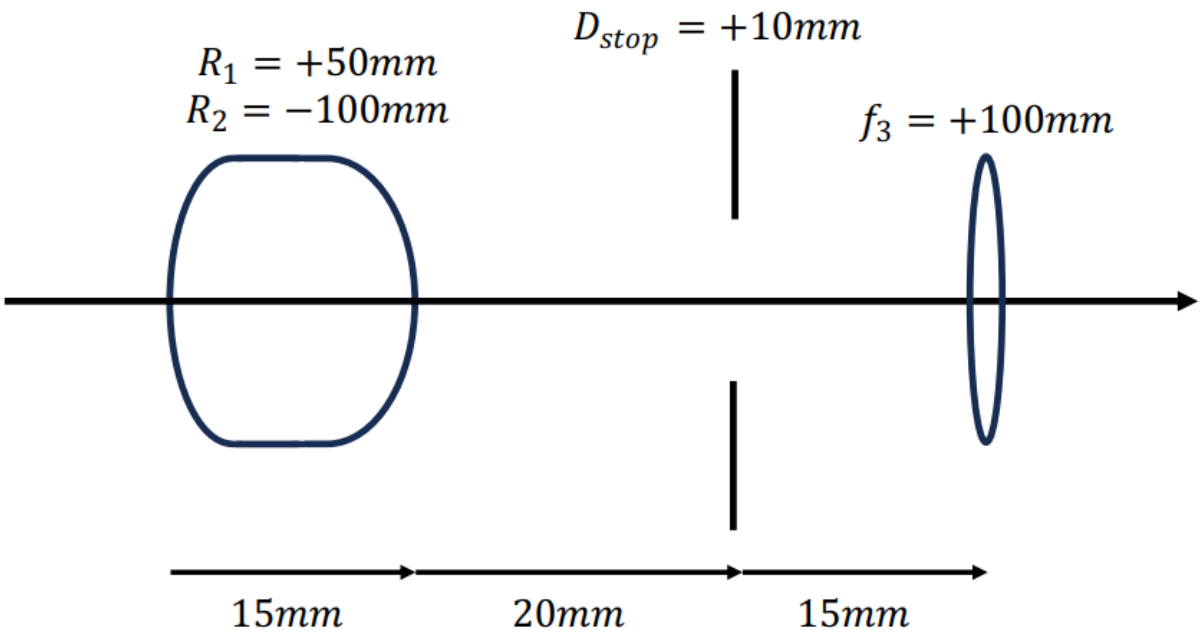


2. Pupil Locations and Sizes

Consider an optical system comprised of a biconvex thick lens ($n = 1.5$) in air, a stop and a thin lens in air. Use paraxial raytrace methods for this problem.

a. Determine the following:

- System focal length
- Back focal distance
- Entrance pupil and exit pupil locations and sizes



b. Now the stop diameter of this system is undefined while f-number is defined. The definition of f-number ($f/\#$) in this case is $f/\# = \frac{f_E}{D_{EP}} = 5$ ($D_{EP} = diameter\ of\ entrance\ pupil$). What are the new diameters of the entrance and exit pupils and the stop?