

物理电子学院 2003 年研究生招生复试试题

适用科目：基础光学

共 5 道题，任选 4 题，每题 25 分，满分 100 分。

闭卷考试，可带英汉词典和计算器。

考试时间 120 分钟，可用英文或中文答题。证明和计算题均需写出中间（推导）过程。

Problem 1. According to the Fermat's (费马) principle, prove the law of refraction.

Problem 2. A converging lens has a focal length of 10.0 cm, find the location of the image for object distance of (a) 30.0 cm, (b) 10.0 cm, and (c) 5.0 cm, respectively, and describe the image in each case.

Problem 3. A lens with the index of refraction $n = 1.5$ is located in the air, the left radius and the right radius are 5.0cm and 10.0cm respectively, and the thick of the lens is 10.0cm. Shown as in Fig.1, one object with height 1mm (note: the object is perpendicular to the optical axis) is located in front of the lens 20.0cm.

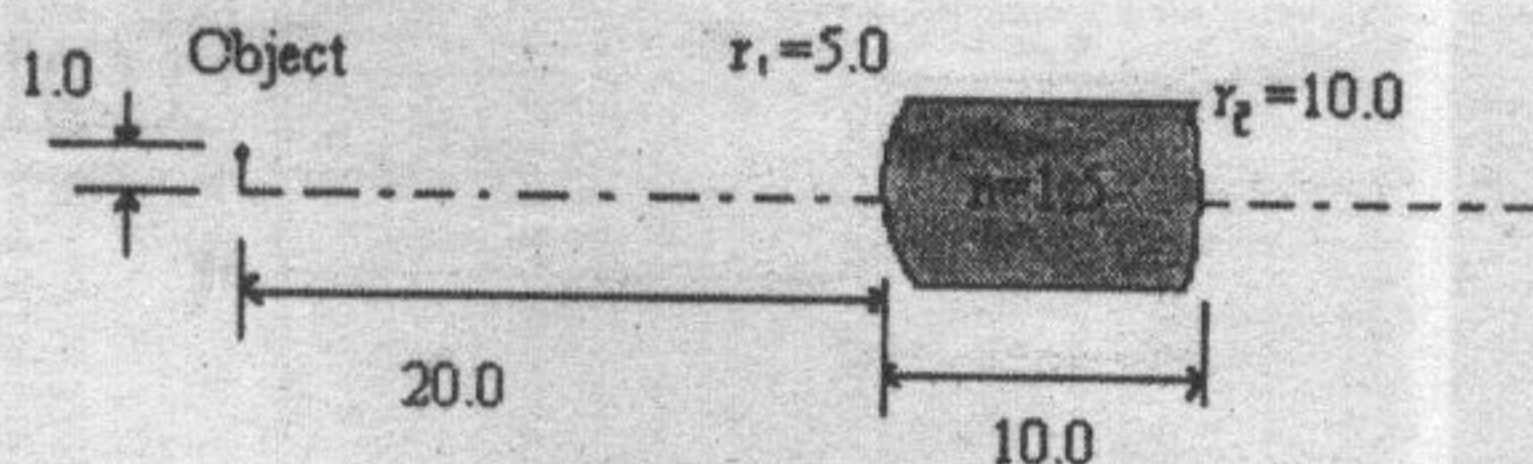


Fig.1

- (1) find the location of the image;
- (2) find the magnification of the lens.

Problem 4. A screen is separated from a double-slit source by $L = 1.2$ m, Shown as in Fig.2. The distance between the two slits is $d = 0.03$ mm. The second-order bright fringe ($m = 2$) is measured to be 4.5 cm from the center line. Determine (a) the wavelength of the light and (b) the distance between the second and the third bright fringes.

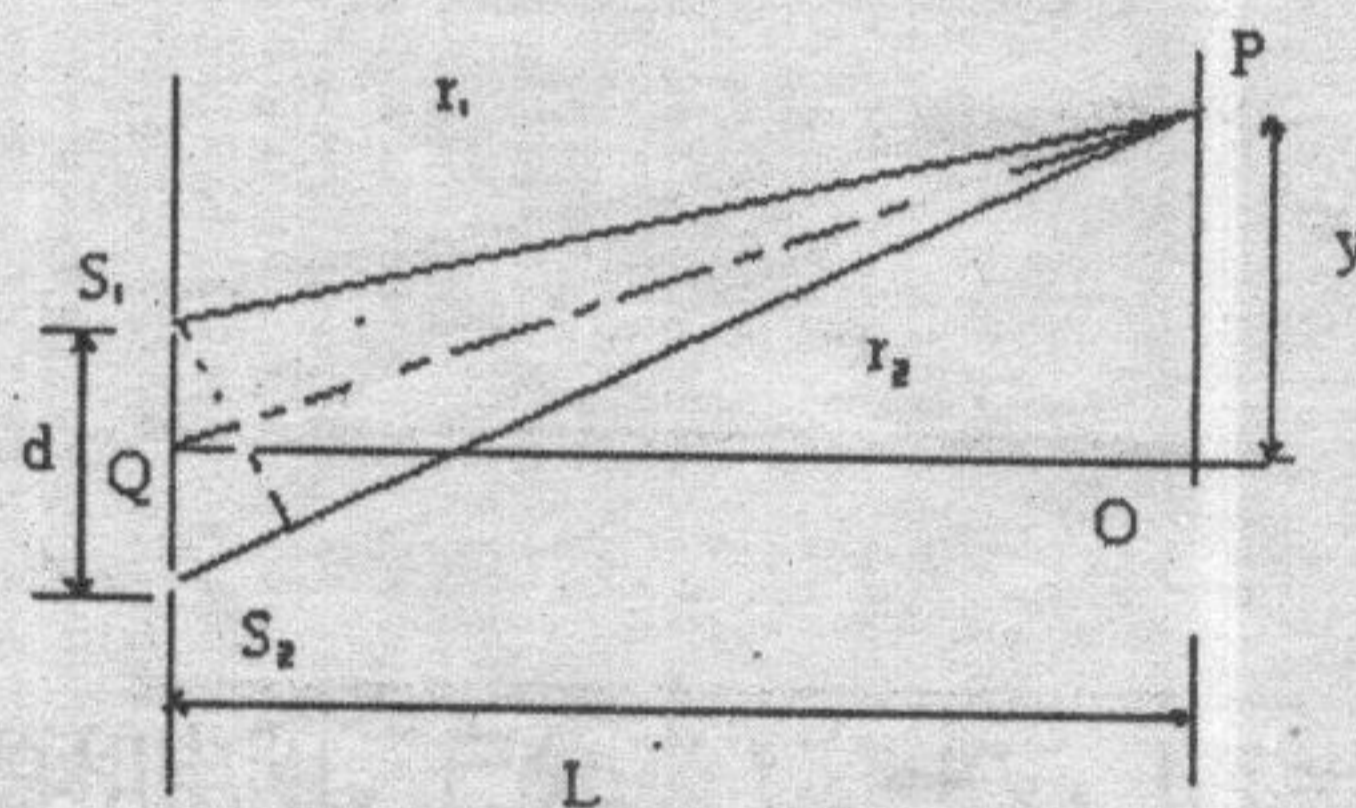


Fig.2

Problem 5. Shown as in Fig. 3.a, prism is a medium bounded by two plane surfaces making an angle A . We assume that the medium has an index of refraction n and that it is surrounded by a medium having unity index, such as air. An incident ray such as PQ suffers two refractions and emerges deviated an angle δ relative to the incident direction. Find the minimum of the deviated angle δ_{\min} .

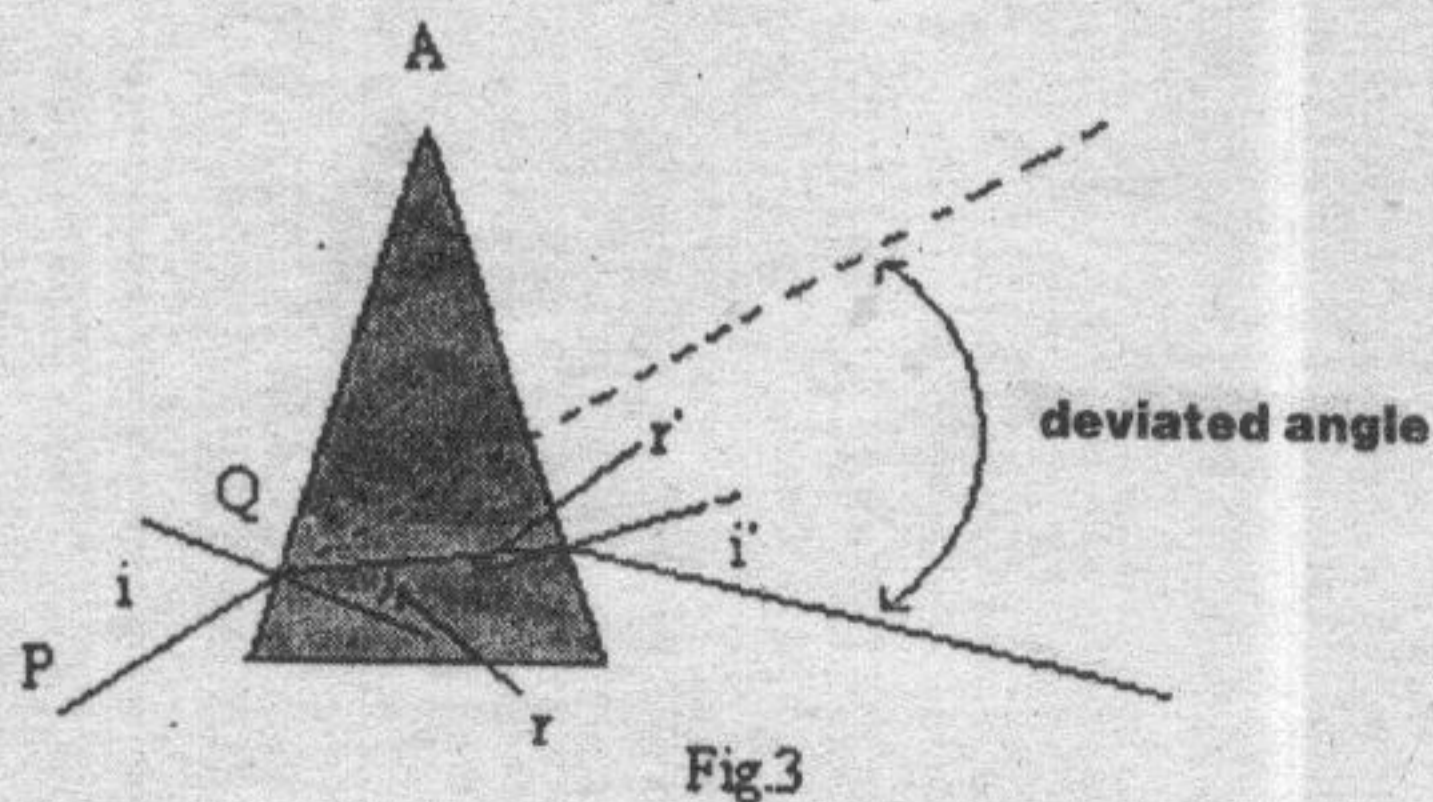


Fig.3