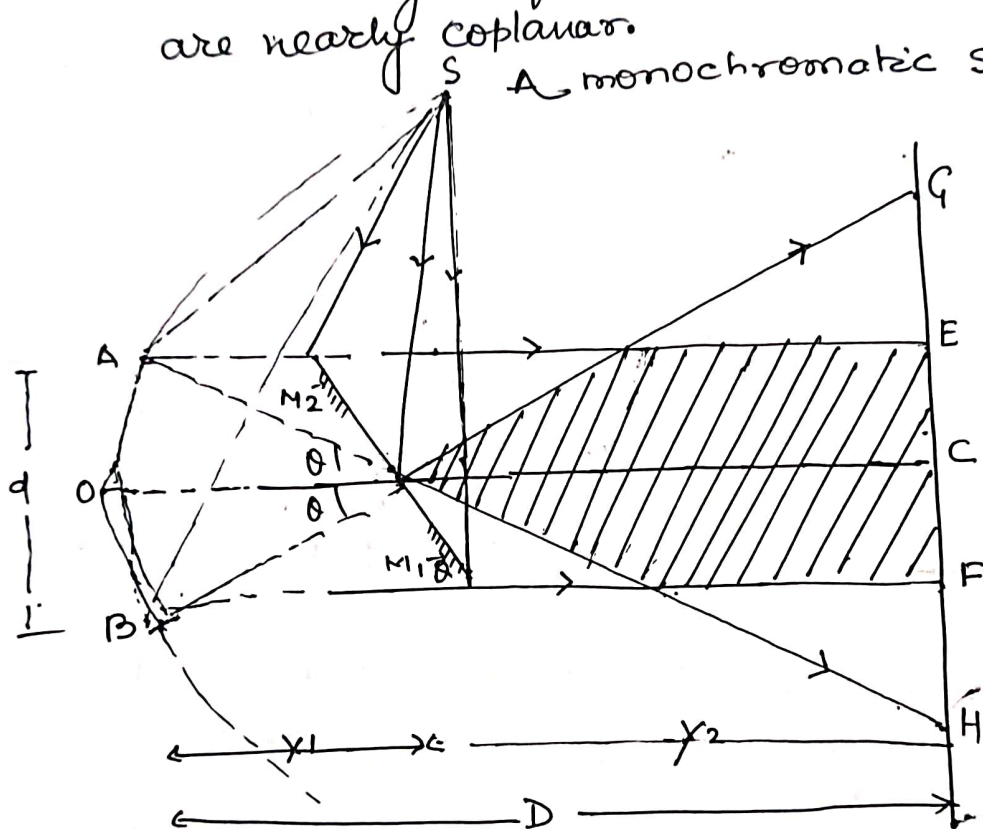


PHYSICS

OPTICS

TOPIC :- Interference by Using Fresnel's Mirrors

Fresnel produced the interference fringes by using two plane mirrors M_1 and M_2 arranged at an angle of approx. 180° so that their surfaces are nearly coplanar.



Light from Source S incident on the two mirror M_1 and M_2 , after reflection, appears to come from two Virtual sources A and B at some distance d . Therefore A and B act as two virtual sources and interference fringes are obtained on the screen. These fringes are obtained of the equal width and are alternately dark and bright.

Principle :- A and B are two coherent sources at a distance d apart.

D = distance from source to virtual sources.

M_1 and M_2 = Two reflected rays from M_1 and M_2 overlap between E and F (shaded) and interference fringes formed

Here $D = Y_1 + Y_2$

Fringe width $\beta = \frac{\lambda D}{d}$

A Point on the screen will be at the centre of a bright fringe, if

it distance from C is $\frac{n\lambda D}{d}$

where $n = 0, 1, 2, 3, \dots$ and

it will be ~~dark~~ at the centre of a dark fringe.

if it distance from C $= \frac{(2n+1)\lambda d}{2d}$

where $n = 0, 1, 2, 3, \dots$

For fringe to be formed the following conditions must be

- (i) The mirror M_1 and M_2 should be made from optically flat glass and silvered on the front surface.
- (ii) No surface should take place from the back of the mirrors.
- (iii) The polished should extend up to the line of intersection of the two mirror and
- (iv) The line of intersection must be parallel to the line sources.

xx — Calculation of distance between two virtual sources A and B :

Suppose the distance between the points of intersection of the mirrors and distance source S is Y_1 .

The angle of separation between A and B is 2θ
 $d = 2\theta Y_1$

When white light is used the central fringes C is white whereas other fringes on both sides of C are coloured because the fringes width depends upon the wave length. Therefore the no. of fringes seen in the field of view with monochromatic sources of light are more

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