649.

Problem 45.49 (RHK)

If mirror M_2 in Michelson's interferometer is moved through 0.233 mm, 792 fringes are counted with a light meter. We have to find the wavelength of light.

Solution:

When one of the mirrors of the Michelson's interferometer, say M_2, is moved by o.233 mm, the additional path difference between the rays that interfere to form fringe will be

$x = 2 \times 0.233 \times 10^{-3}$ m.

If 792 fringes are counted during the process, the path difference x will be related to wavelength λ as

$792\lambda = 0.466 \times 10^{-3}$ m,

and

$$\lambda = \frac{0.466 \times 10^{-3}}{792} \text{ m} = 588 \text{ nm}.$$