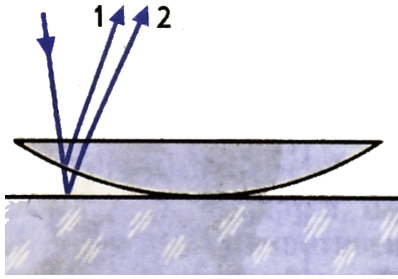**Answer on** Question #65379, Physics / Optics

Why central rings in the Newton's ring always be dark.

Solution:

Optical path difference of waves 1 and 2:

$$OPD = nd + \frac{\lambda}{2} \, (1),$$

where n is refractive index of layer (air), d is physical length, λ is wavelength.

Light passes from medium with less optical density (air) to the medium with more optical density (glass). In this way, OPD increases by $\frac{\lambda}{2}$.

For central ring: d=0 m (2).

(2) in (1): $OPD = \frac{\lambda}{2} \, (3)$

The condition of minimum interference (dark rings):

$$OPD = (2k + 1)\frac{\lambda}{2} \, (4),$$

where $k = 0, \pm 1, \pm 2, \ldots$

Of (4) $\Rightarrow$ if k=0, then $OPD = \frac{\lambda}{2} \, (5)$

Of (3) and (5) $\Rightarrow$ central rings in the Newton's rings always be dark.