

41. Consider two of the rays shown in Fig. 37-37, one just above the other. The extra distance traveled by the lower one may be found by drawing perpendiculars from where the top ray changes direction (point P) to the incident and diffracted paths of the lower one. Where these perpendiculars intersect the lower ray's paths are here referred to as points A and C . Where the bottom ray changes direction is point B . We note that angle $\angle APB$ is the same as ψ , and angle $\angle BPC$ is the same as θ (see Fig. 37-37). The difference in path lengths between the two adjacent light rays is $\Delta x = |AB| + |BC| = d \sin \psi + d \sin \theta$. The condition for bright fringes to occur is therefore

$$\Delta x = d(\sin \psi + \sin \theta) = m\lambda$$

where $m = 0, 1, 2, \dots$. If we set $\psi = 0$ then this reduces to Eq. 37-22.