Question. Obtain the expression for area of the $n$ - th zone.
Solution.


Find the area of the $n-t h$ Fresnel zone

$$
\Delta S_{n}=S_{n}-S_{n-1}
$$

From the figure

$$
r_{n}^{2}=a^{2}+\left(a-h_{n}\right)^{2}=\left(b+n \frac{\lambda}{2}\right)^{2}-\left(b-h_{n}\right)^{2}
$$

$$
\lambda \ll a \text { and } \lambda \ll b
$$

We have

$$
\begin{gathered}
h_{n}=\frac{b n \lambda}{2(a+b)} \\
S_{n}=2 \pi a h_{n}=\frac{\pi a b \lambda}{a+b} n \\
\Delta S_{n}=S_{n}-S_{n-1}=\frac{\pi a b \lambda}{a+b}
\end{gathered}
$$

So, the area of the $n-t h$ Fresnel zone

$$
\Delta S_{n}=\frac{\pi a b \lambda}{a+b}
$$

and does not depend on $n$.
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