1.11.6

AI25BTECH11004-B.JASWANTH

Question

Find the direction cosines of a line which makes equal angles with the coordinate axes.

Solution:

Let θ be the angle made by a line with coordinate axes. The direction cosines of line l are given by $\begin{pmatrix}\cos\theta\\ \cos\theta\\ \cos\theta\end{pmatrix}$

Since $\|l\| = 1$, we have

$$\cos^2\theta + \cos^2\theta + \cos^2\theta = 1 \tag{0.1}$$

$$3\cos^2\theta = 1 \quad \Rightarrow \quad \cos^2\theta = \frac{1}{3} \tag{0.2}$$

Since θ is an acute angle,

$$\cos\theta = \frac{1}{\sqrt{3}} \tag{0.3}$$

Hence,direction cosines of a line are $\begin{pmatrix}\frac{1}{\sqrt{3}}\\ \frac{1}{\sqrt{3}}\\ \frac{1}{\sqrt{3}}\end{pmatrix}$