1.10.30

EE24BTECH11002 - Agamjot Singh

Question:
If a line has direction ratios 2, -1, 2, determine its direction cosines.
Solution:
Let

$$\mathbf{A} = \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix} \tag{1}$$

$$\|A\| = \sqrt{\mathbf{A}^\top \mathbf{A}} \tag{2}$$

$$= \sqrt{\begin{pmatrix} 2 & -1 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix}} \tag{3}$$

$$\implies \|A\| = 3 \tag{4}$$

The unit direction vector of the line is

$$\frac{\mathbf{A}}{\|\mathbf{A}\|} = \frac{\begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix}}{3} = \begin{pmatrix} \frac{2}{3} \\ \frac{-1}{3} \\ \frac{2}{3} \end{pmatrix} \tag{5}$$

Hence, the direction cosines of the line are $\frac{2}{3}$, $\frac{-1}{3}$ and $\frac{2}{3}$.

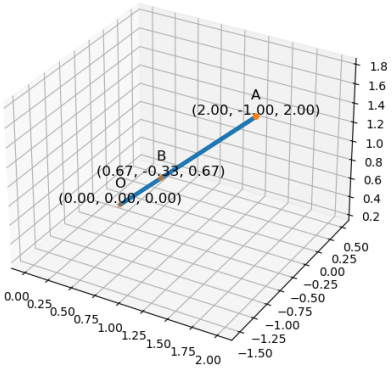

Fig. 0: Line with given direction ratios, where **B** is unit direction vector