

1.1.10.22

EE24BTECH11024 - G.Abhimanyu Koushik

Question:

A vector \mathbf{r} is inclined at equal angles to the three axis. If the magnitude of \mathbf{r} is $2\sqrt{3}$ units, find \mathbf{r} .

Solution:

Symbol	Description
\mathbf{r}	Given vector
c	Scaling factor

TABLE 0: Variables Used

A vector which subtends equal angles to all three axes will have equal components, and given the length of vector is $2\sqrt{3}$.

$$\mathbf{r} = c \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \quad (0.1)$$

$$\|\mathbf{r}\| = |c| \left\| \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\| \quad (0.2)$$

$$\|\mathbf{r}\| = |c| \sqrt{3} \quad (0.3)$$

$$2\sqrt{3} = |c| \sqrt{3} \quad (0.4)$$

$$|c| = 2 \quad (0.5)$$

$$\Rightarrow \mathbf{r} = \begin{pmatrix} 2 \\ 2 \\ 2 \end{pmatrix} \text{ or } \mathbf{r} = \begin{pmatrix} -2 \\ -2 \\ -2 \end{pmatrix} \quad (0.6)$$

3D Vector Plot of vector which has equal angles to all axes

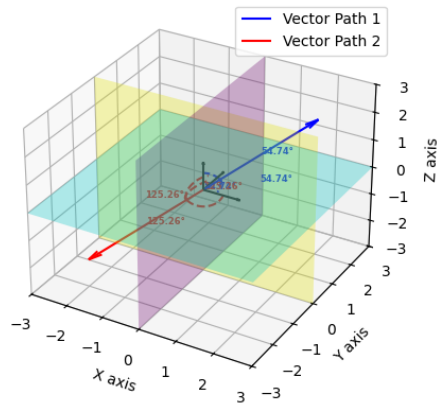


Fig. 0.1: Vectors inclining equally to all axes and of length $2\sqrt{3}$