

2.10.78

EE25BTECH11050-Hema Havil

Question:

Find the equation of the line that passes through the point with position vector $2\hat{i} - \hat{j} + 4\hat{k}$ and is in direction $\hat{i} + 2\hat{j} - \hat{k}$.

Solution:

Given,
the point on the line,

$$\mathbf{r}_0 = \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix} \quad (0.1)$$

the direction vector of the line,

$$\mathbf{d} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \quad (0.2)$$

Let the position vector of any point on the line be \mathbf{r}_t then,

$$\mathbf{r}_t = \mathbf{r}_0 + t\mathbf{d} \quad (0.3)$$

$$\mathbf{r}_t = \begin{pmatrix} 2 + t \\ -1 + 2t \\ 4 - t \end{pmatrix} \quad (0.4)$$

where t is the parameter,
Therefore the equation of the line is

$$\mathbf{r}_t = \begin{pmatrix} 2 + t \\ -1 + 2t \\ 4 - t \end{pmatrix} \quad (0.5)$$

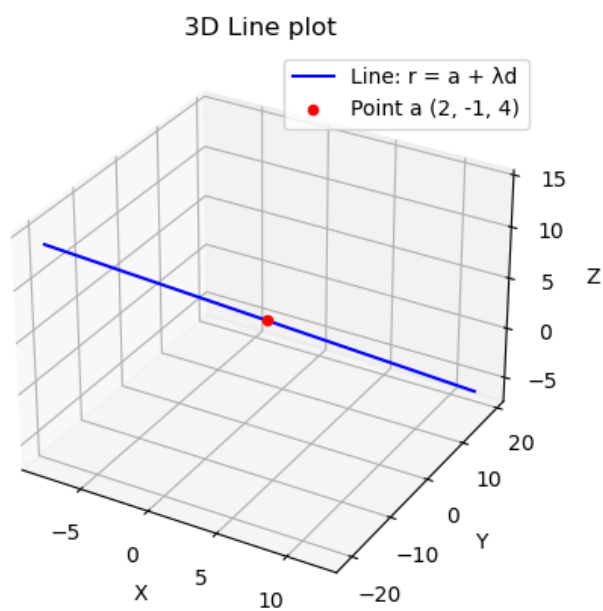


Fig. 0.1: Plot of the 3D line