MatGeo Assignment 4.4.3

AI25BTECH11007

Question:
Equation of the line passing through the origin and making 30° , 60°, and 90° with the X, Y, Z axes respectively is.

Solution: The equation of a line passing through the origin and making angles α, β, γ with the X, Y, Z axes respectively is given by

$$\frac{x}{\cos\alpha} = \frac{y}{\cos\beta} = \frac{z}{\cos\gamma}.$$

Here, $\alpha = 30°, \beta = 60°, \gamma = 90°$.

Direction Cosines,

$$\cos 30° = \frac{\sqrt{3}}{2}, \quad \cos 60° = \frac{1}{2}, \quad \cos 90° = 0.$$

$$\frac{x}{\frac{\sqrt{3}}{2}} = \frac{y}{\frac{1}{2}} = \frac{z}{0}.$$

Final equation of the line ,

$$y = \frac{x}{\sqrt{3}}, \quad z = 0.$$

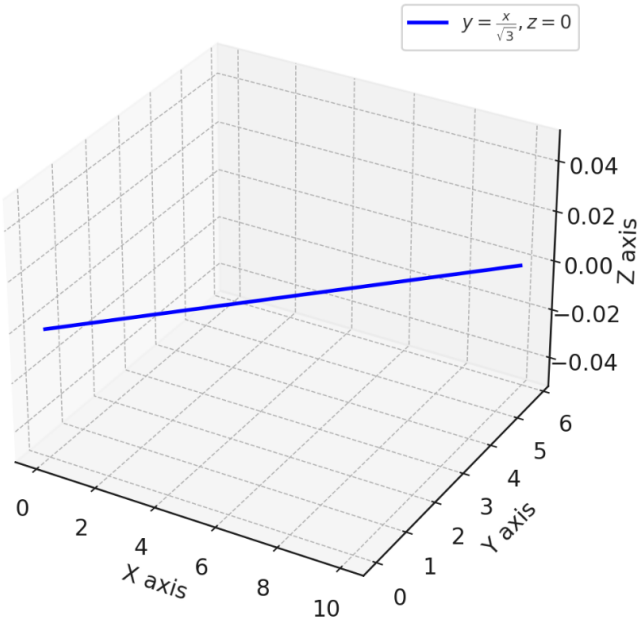
$y = \frac{x}{\sqrt{3}}, z = 0$
0.04
0.02
0.00
−0.02
−0.04
Z axis
0
2
4
6
8
10
X axis
0
1
2
3
4
5
6
Y axis

Fig. 0.1: Plot