

4.8.13

AI25BTECH11017-BALU

Question:

Find the distance between the planes

$$\mathbf{r} \cdot (2\hat{i} - 3\hat{j} + 6\hat{k}) - 4 = 0 \quad \text{and} \quad \mathbf{r} \cdot (6\hat{i} - 9\hat{j} + 18\hat{k}) + 30 = 0. \quad (0.1)$$

Solution:

Let us solve the given equation theoretically and then verify the solution computationally

According to the question,

Given two planes with direction vectors

$$\mathbf{n}_1 = \begin{pmatrix} 2 \\ -3 \\ 6 \end{pmatrix} \quad \mathbf{n}_2 = \begin{pmatrix} 6 \\ -9 \\ 18 \end{pmatrix} \quad (0.2)$$

$$\mathbf{n}_2 = 3\mathbf{n}_1 \quad (0.3)$$

so the are planes are parallel

Let us take a point in plane 1

$$\mathbf{A} = \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix} \quad (0.4)$$

As planes are parallel distance from \mathbf{A} to plane 2 is same as distance between planes

Let distance is k

$$k = \frac{(\mathbf{A}\mathbf{n}_2^T) + 30}{\|\mathbf{n}_2\|} = 2 \quad (0.5)$$

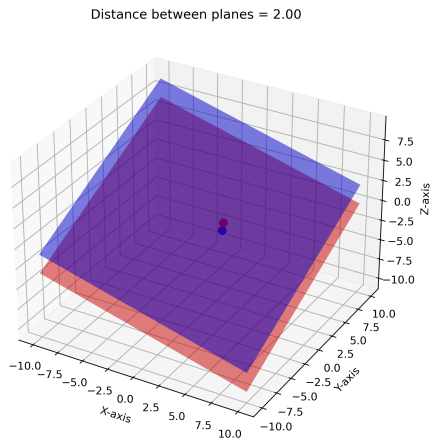


Fig. 0.1