

Assignment 6: 4.3.45

EE25BTECH11055 - Subhodeep Chakraborty

Question:

Find the coordinates of the point where the line through $(5, 1, 6)$ and $(3, 4, 1)$ crosses the ZX -plane.

Solution:

Given:

$$\mathbf{A} = \begin{pmatrix} 5 \\ 1 \\ 6 \end{pmatrix} \quad (1)$$

$$\mathbf{B} = \begin{pmatrix} 3 \\ 4 \\ 1 \end{pmatrix} \quad (2)$$

We know,

$$\mathbf{x} = \mathbf{h} + k\mathbf{m} \quad (3)$$

$$= \mathbf{A} + k(\mathbf{B} - \mathbf{A}) \quad (4)$$

$$\mathbf{e}_3^\top \mathbf{x} = 0 \quad (5)$$

Thus

$$\mathbf{x} = \begin{pmatrix} 5 - 2k \\ 1 + 3k \\ 6 - 5k \end{pmatrix} \quad (6)$$

$$\mathbf{e}_3^\top \mathbf{x} = 0 \implies k = 6/5 \quad (7)$$

$$\mathbf{x} = \begin{pmatrix} 13/5 \\ 23/5 \\ 0 \end{pmatrix} \quad (8)$$

4.3.45

