

21-S-2-7-AG-054

Point A is located at the coordinates $A = 0\hat{i} + Y\hat{j} + Z\hat{k}$. Point B is located at $B = A\hat{i} + 0\hat{j} + C\hat{k}$. A rope is stretched between points A and B with a tension force of F N. What are the directional components of the tension force as seen from point A?

ANSWER:

The directional vector at point A is,

$$\mathbf{A} = (x_B - x_A)\hat{i} + (y_B - y_A)\hat{j} + (z_B - z_A)\hat{k} = A\hat{i} - Y\hat{j} + (C - Z)\hat{k}$$

The directional components of the tension force are then,

$$F_x = \frac{F}{\sqrt{A^2 + Y^2 + (C - Z)^2}} \cdot A$$

$$F_y = \frac{F}{\sqrt{A^2 + Y^2 + (C - Z)^2}} \cdot -Y$$

$$F_z = \frac{F}{\sqrt{A^2 + Y^2 + (C - Z)^2}} \cdot (C - Z)$$