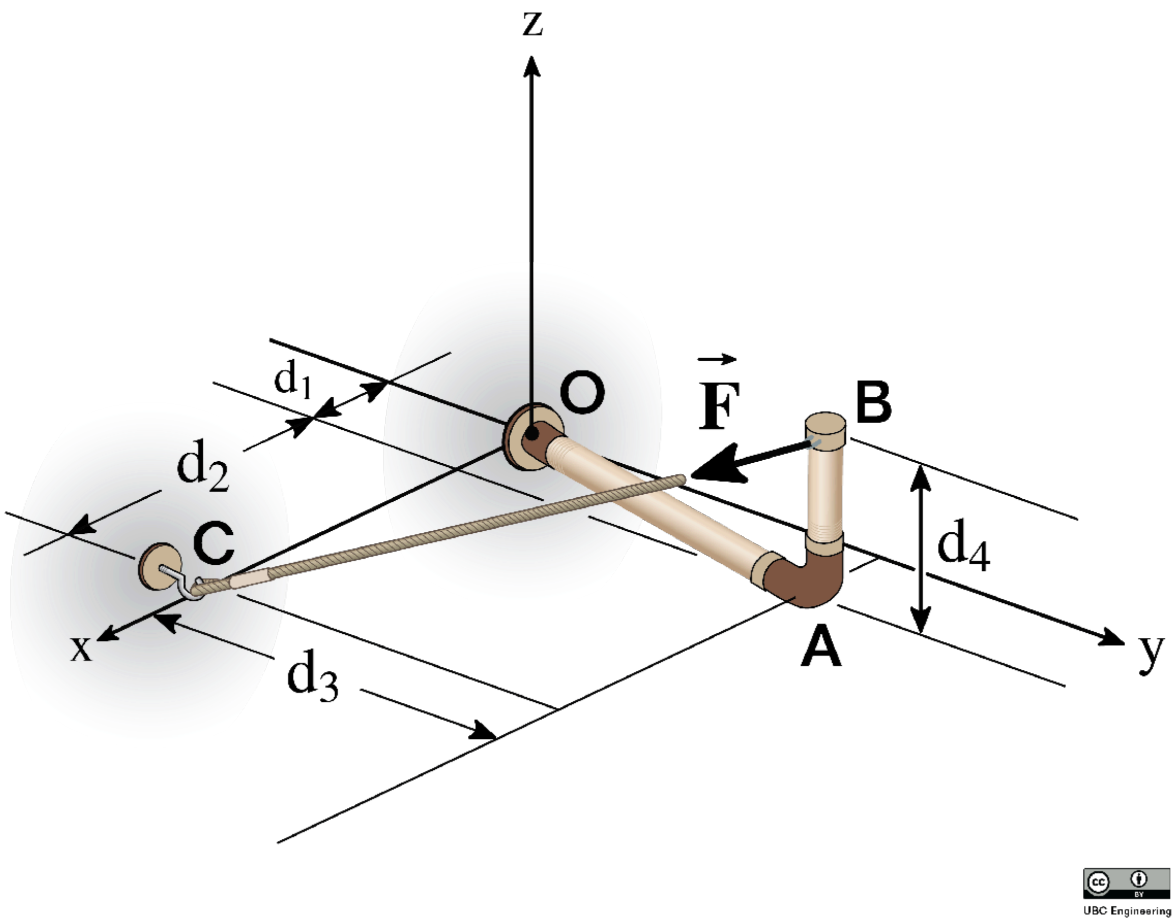

A rope is held in tension by the pipe OB and the hook at C. If $\vec{F}$ has an x component of F_x, express the force $\vec{F}$ as a cartesian vector, find its magnitude, and find the coordinate direction angles.

Since $\dfrac{\vec{F}}{||\vec{F}||} = \hat{u}_{BC} = \dfrac{\vec{r}_{BC}}{||\vec{r}_{BC}||}$,

$$\Rightarrow \vec{F} = \frac{||\vec{F}||}{||\vec{r}_{BC}||} \cdot (d_2\hat{i} - d_3\hat{j} - d_4\hat{k})$$

$$F_x = \frac{||\overrightarrow{F}||}{||\overrightarrow{r}_{BC}||} \cdot d_2$$

$$F_y = \frac{||\overrightarrow{F}||}{||\overrightarrow{r}_{BC}||} \cdot (-d_3)$$

$$F_z = \frac{||\overrightarrow{F}||}{||\overrightarrow{r}_{BC}||} \cdot (-d_4)$$

$$\Rightarrow \frac{F_x}{d_2} = \frac{F_y}{-d_3} = \frac{F_z}{-d_4}$$

$$\overrightarrow{F} = F_x \hat{i} + \frac{-d_3}{d_2} \cdot F_x \hat{j} + \frac{-d_4}{d_2} \cdot F_x \hat{k}$$

$$||\overrightarrow{F}|| = F = \sqrt{{F_x}^2 + {F_y}^2 + {F_z}^2}$$

$$\alpha = \cos^{-1}\left(\frac{F_x}{F}\right)$$

$$\beta = \cos^{-1}\left(\frac{F_y}{F}\right)$$

$$\gamma = \cos^{-1}\left(\frac{F_z}{F}\right)$$