Introduction to Trigonometry with Applications

APPLICATION EXAMPLE: ANALYSIS FOR ERROR IN POSITIONING OF TIP OF ONE-LINK ROBOT

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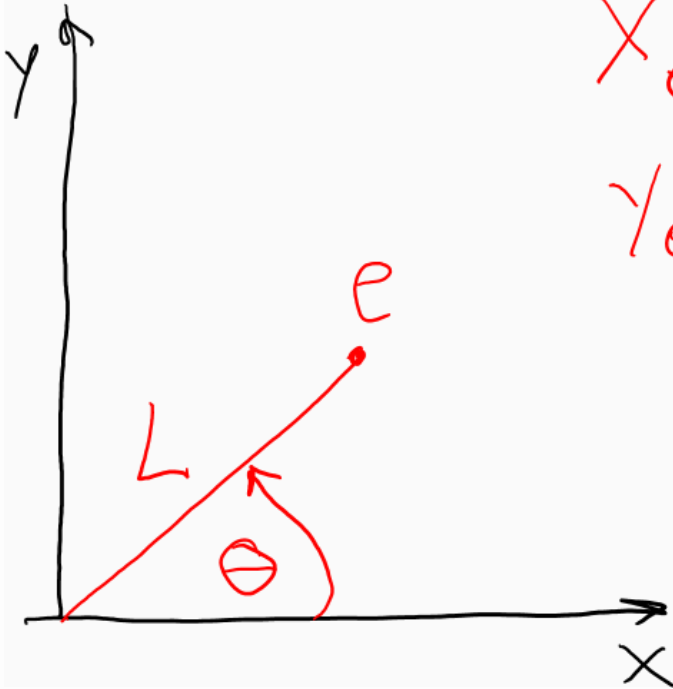COLLEGE OF ENGINEERING

UNIVERSITY OF TEXAS AT ARLINGTON

Application Example A:
Analysis for Error in Positioning of Tip of One-Link Robot
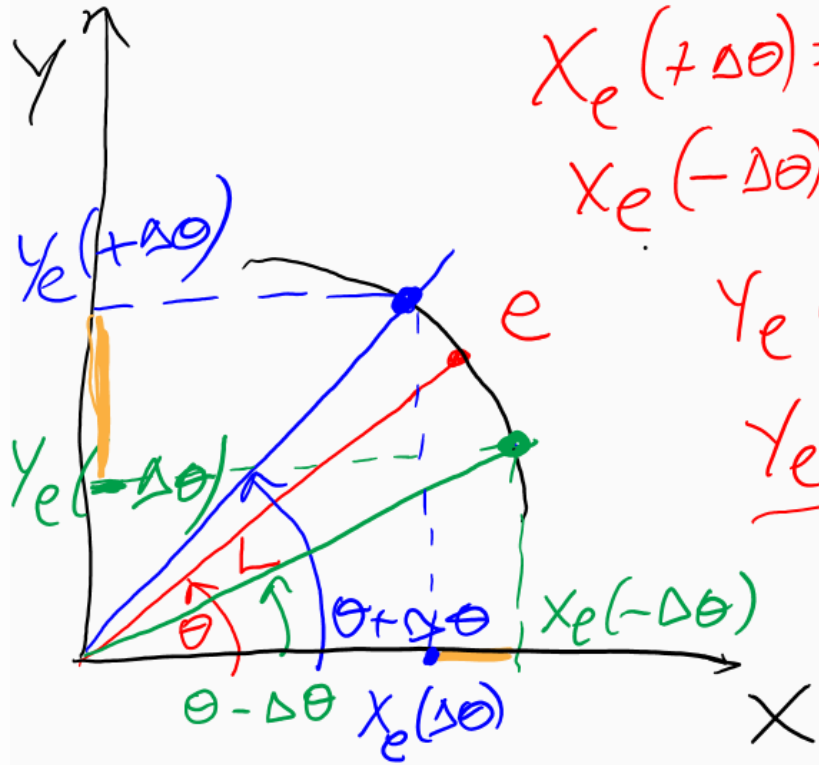

$$X_e = L \cos(\theta)$$

$$Y_e = L \sin(\theta)$$

$$\theta \rightarrow \text{ERROR } \Delta\theta : \quad \theta \pm \Delta\theta$$

$$X_e = L \cos(\theta \pm \Delta\theta)$$

$$Y_e = L \sin(\theta \pm \Delta\theta)$$

Application Example B:
Analysis for Error in Positioning of Tip of One-Link Robot

$$X_e(+\Delta\theta) = L\cos(\theta + \Delta\theta)$$

$$X_e(-\Delta\theta) = L\cos(\theta - \Delta\theta)$$

$$Y_e(+\Delta\theta) = L\sin(\theta + \Delta\theta)$$

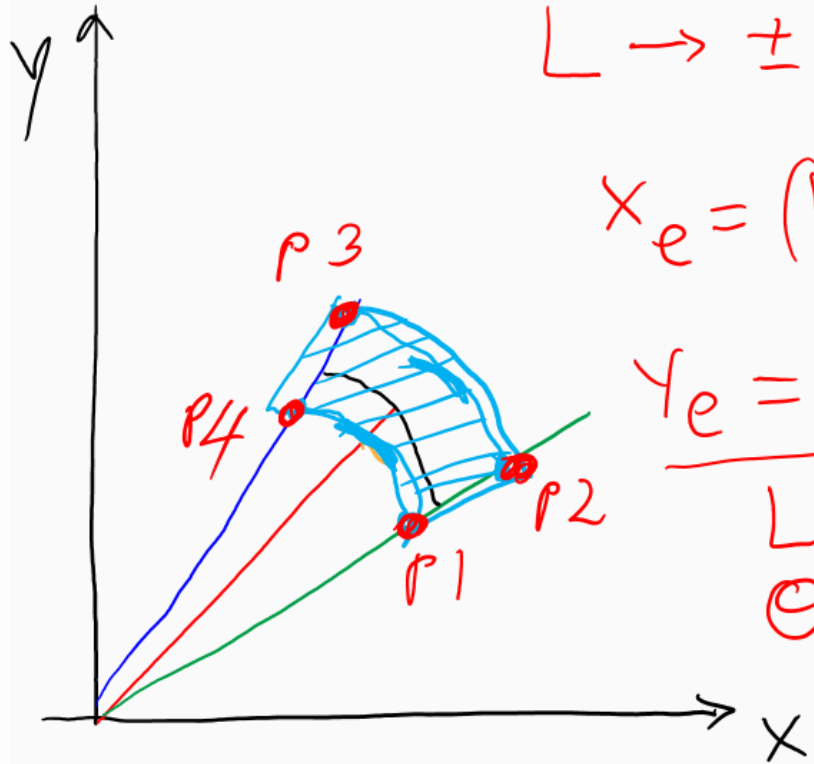$$Y_e(-\Delta\theta) = L\sin(\theta - \Delta\theta)$$

$$L: 50\,cm$$

$$\Delta\theta: 0.5\ degree$$

$$\theta = 45°$$

Application Example C:
Analysis for Error in Positioning of Tip of One-Link Robot

$$L \rightarrow \pm \Delta L \quad ; \quad \theta \rightarrow \pm \Delta \theta$$

$$x_e = (L \pm \Delta L) \cos(\theta \pm \Delta\theta)$$

$$y_e = (L \pm \Delta L) \sin(\theta \pm \Delta\theta)$$

$L: 50\,mm \; ; \quad \Delta L: 1\,mm$

$\Theta: 45^\circ \; ; \quad \Delta\theta = 0.5^\circ$

$P_1 \, \& P_4 \quad ; \quad P_2 \, \& P_3 \qquad \begin{array}{l} P_1 \, \& P_2 \\ P_3 \, \& P_4 \end{array}$