

Fourbar position analysis

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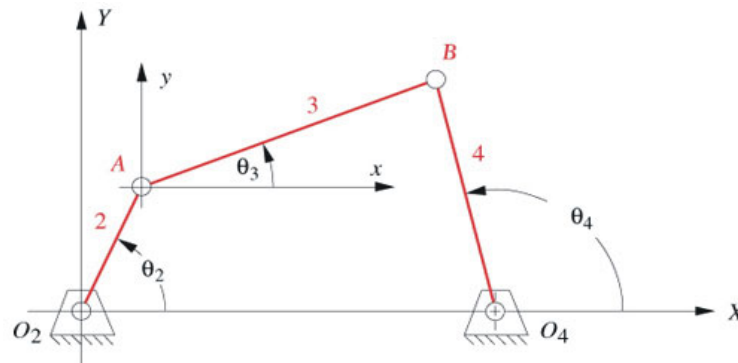


FIGURE 4-4

Measurement of angles in the fourbar linkage

Given:

Link 1: $d := 10$ Link 3: $b := 6$

Link 2: $a := 3$ Link 4: $c := 9$

input link angle: $\theta_2 := 65 \cdot \text{deg}$

Constants from Equations 4.8a and 4.10a:

Output link angle (1:open, 2:crossed) from Equation 4.10b:

Open: $\theta_{41}(\theta_2) := \blacksquare$

$\theta_{41}(\theta_2) = \blacksquare \text{ deg}$

Crossed: $\theta_{42}(\theta_2) := \blacksquare$

$\theta_{42}(\theta_2) = \blacksquare \text{ deg}$

Constants from equations 4.11b and 4.12:

Coupler link angle (1:open, 2:crossed) from Equation 4.13:

Open: $\theta_{31}(\theta_2) := \blacksquare$

$\theta_{31}(\theta_2) = \blacksquare \text{ deg}$

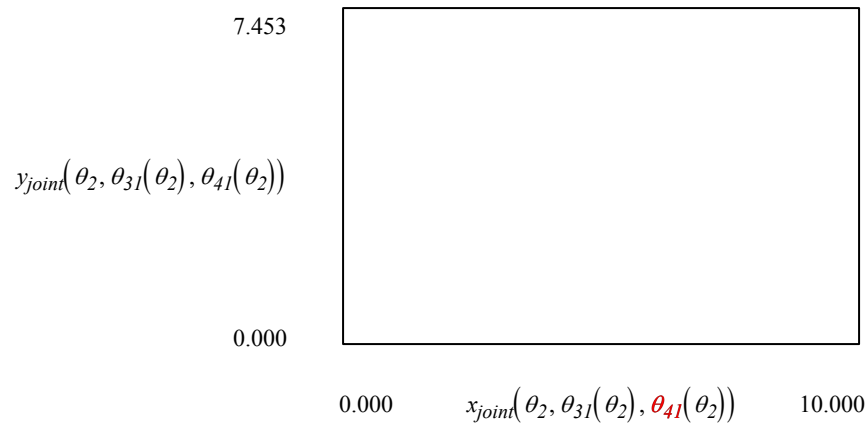
Crossed: $\theta_{32}(\theta_2) := \blacksquare$

$\theta_{32}(\theta_2) = \blacksquare \text{ deg}$

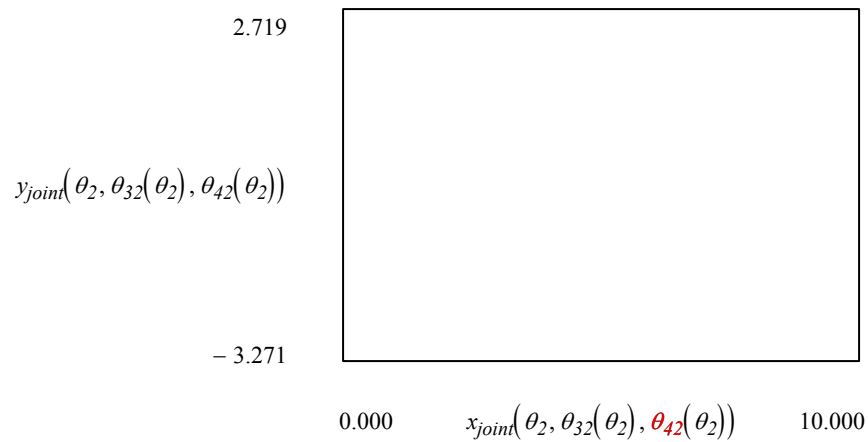
Linkage positions:

$$x_{joint}(\theta_2, \theta_3, \theta_4) := \begin{pmatrix} 0 \\ a \cdot \cos(\theta_2) \\ a \cdot \cos(\theta_2) + b \cdot \cos(\theta_3) \\ d \end{pmatrix} \quad y_{joint}(\theta_2, \theta_3, \theta_4) := \begin{pmatrix} 0 \\ a \cdot \sin(\theta_2) \\ a \cdot \sin(\theta_2) + b \cdot \sin(\theta_3) \\ 0 \end{pmatrix}$$

open:



crossed:



Transmission angle:

$$\mu_{A1} := |\theta_{41}(\theta_2) - \theta_{31}(\theta_2)| \quad \mu_{A1} := \text{if}(\mu_{A1} > 180 \cdot \text{deg}, |360 \cdot \text{deg} - \mu_{A1}|, \mu_{A1})$$

$$\mu_{A1} = \blacksquare \text{ deg}$$

$$\mu_{A2} := |\theta_{42}(\theta_2) - \theta_{32}(\theta_2)| \quad \mu_{A2} := \text{if}(\mu_{A2} > 180 \cdot \text{deg}, |360 \cdot \text{deg} - \mu_{A2}|, \mu_{A2})$$

$$\mu_{A2} = \blacksquare \text{ deg}$$

Coupler point:

$$p := 6 \quad \delta := 45 \cdot \text{deg}$$

$$x_p(\theta_2) := a \cdot \cos(\theta_2) + p \cdot \cos(\theta_{31}(\theta_2) + \delta) \quad x_p(\theta_2) = \blacksquare$$

$$y_p(\theta_2) := a \cdot \sin(\theta_2) + p \cdot \sin(\theta_{31}(\theta_2) + \delta) \quad y_p(\theta_2) = \blacksquare$$

Coupler Path:

$$\theta_2 := 0 \cdot \text{deg}, 1 \cdot \text{deg} .. 360 \cdot \text{deg}$$

