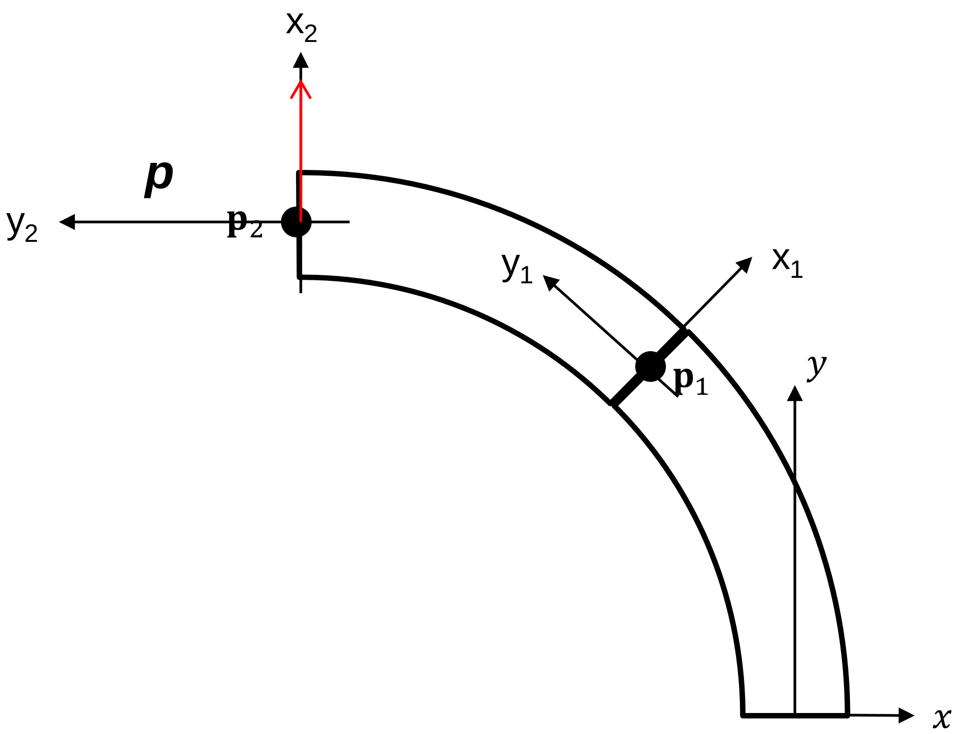
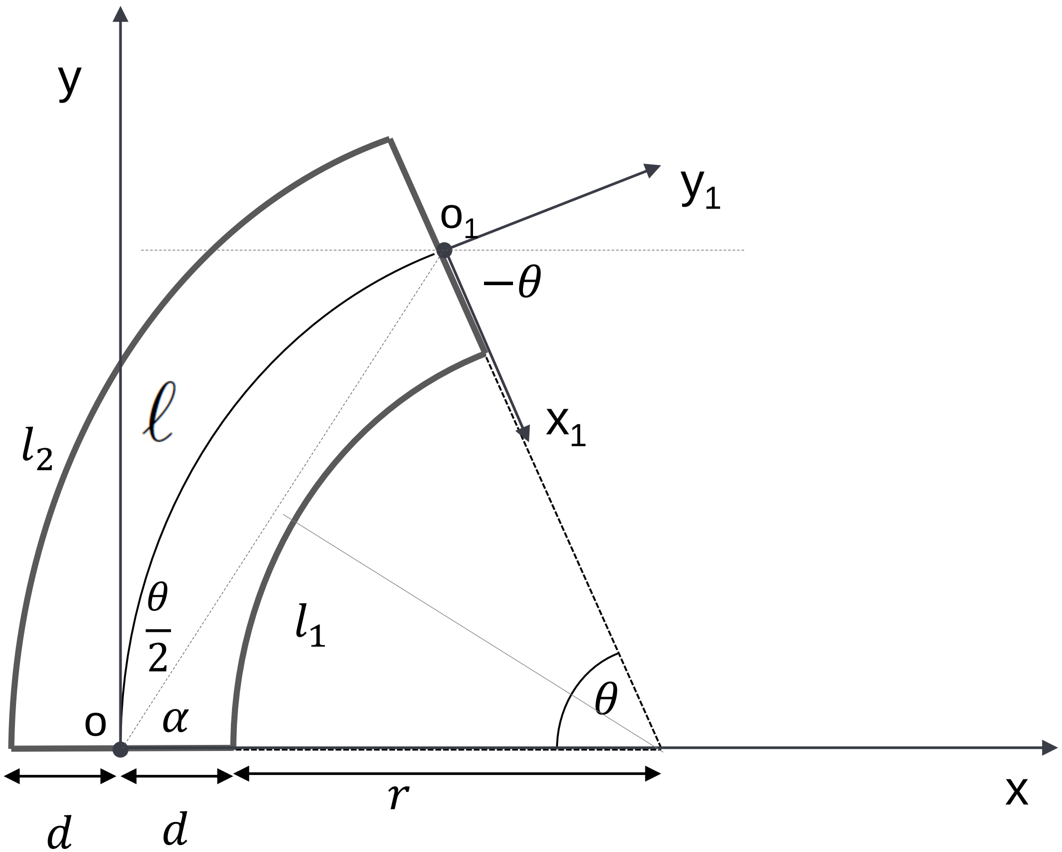
# Project-1




$P2 = [1\ 0]^T$ in frame 2

Suppose we know the tendon lengths ($l_{2i}$,$l_{1i}$) in each segment, write a Matlab program to compute the position *P* in the base frame use the 2D constant curvature model and the homogenous transformation matrices.

The two tendons in each segment is placed 2*d* apart.

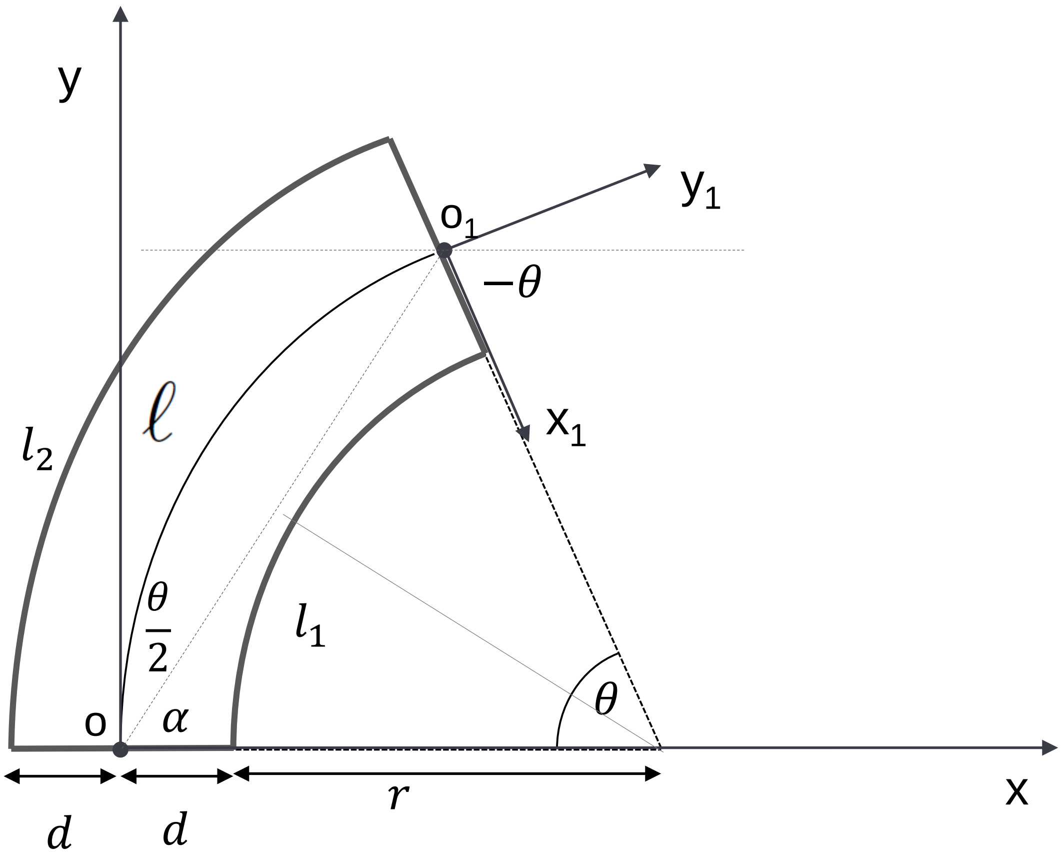



$$l = \frac{l_2 + l_1}{2}$$

$$\theta = \frac{l_2 - l_1}{2d}$$

$$\alpha = \frac{\pi}{2} - \frac{\theta}{2}$$

The tendon arrangement in each segment



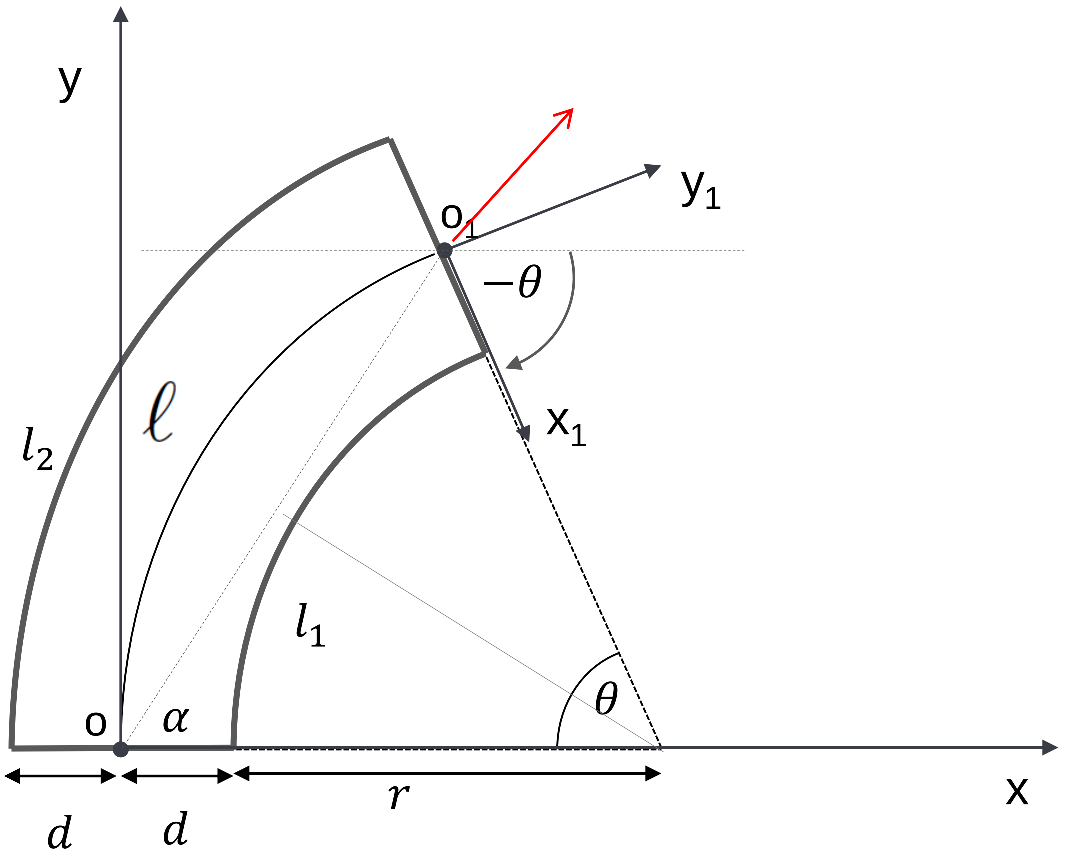

$$l = \frac{l_2 + l_1}{2}$$

$$\theta = \frac{l_2 - l_1}{2d}$$

$$\alpha = \frac{\pi}{2} - \frac{\theta}{2}$$

$$oo_1 = 2\frac{l}{\theta}cos\alpha$$

$$o_1 = \left[\frac{2l}{\theta}(cos\alpha)^2, \frac{2l}{\theta}cos\alpha sin\alpha\right]^T$$



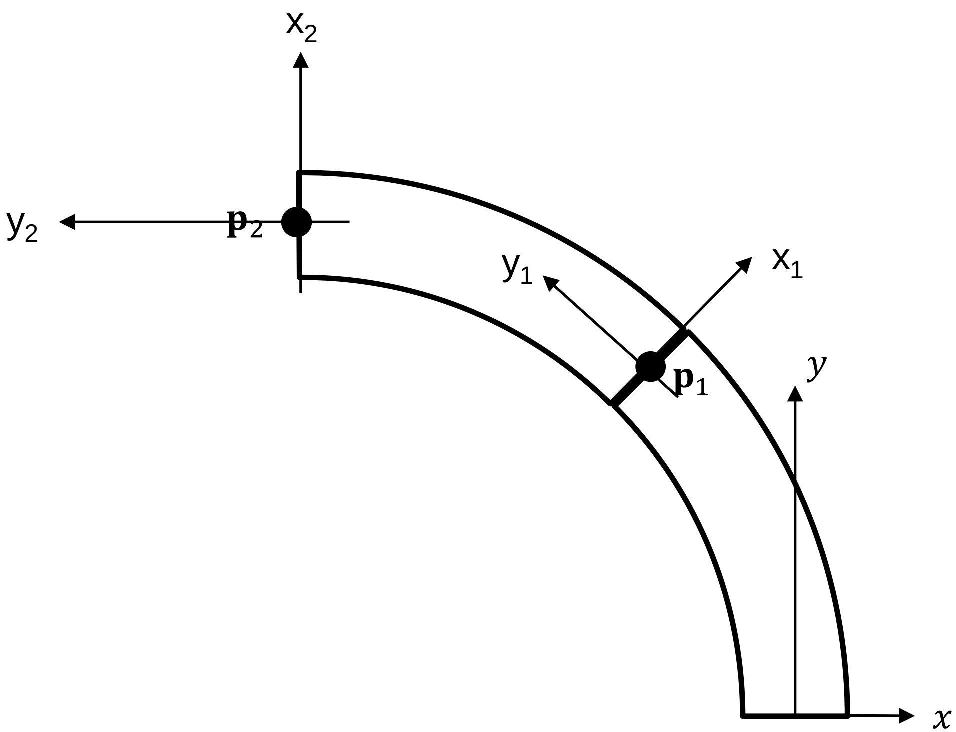

$$\alpha = \frac{\pi}{2} - \frac{\theta}{2}$$

$$o_1 = \left[\frac{2l}{\theta}(cos\alpha)^2, \frac{2l}{\theta}cos\alpha sin\alpha\right]^T$$

$$R = \begin{bmatrix} \cos(-\theta) & -\sin(-\theta) \\ \sin(-\theta) & \cos(-\theta) \end{bmatrix}$$

$$A_1^0 = \begin{bmatrix} R & o_1 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} p_0 \\ 1 \end{bmatrix} = A_1^0 \begin{bmatrix} p_1 \\ 1 \end{bmatrix}$$




$$\theta_i = \frac{l_{2i} - l_{1i}}{2d}$$

$$l_i = \frac{l_{2i} + l_{1i}}{2}$$

$$A_1^0 = \begin{bmatrix} R(\theta_1) & o_1 \\ 0 & 1 \end{bmatrix}$$

$$A_2^1 = \begin{bmatrix} R(\theta_2) & o_2 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} p_0 \\ 1 \end{bmatrix} = A_1^0 A_2^1 \begin{bmatrix} p_2 \\ 1 \end{bmatrix}$$

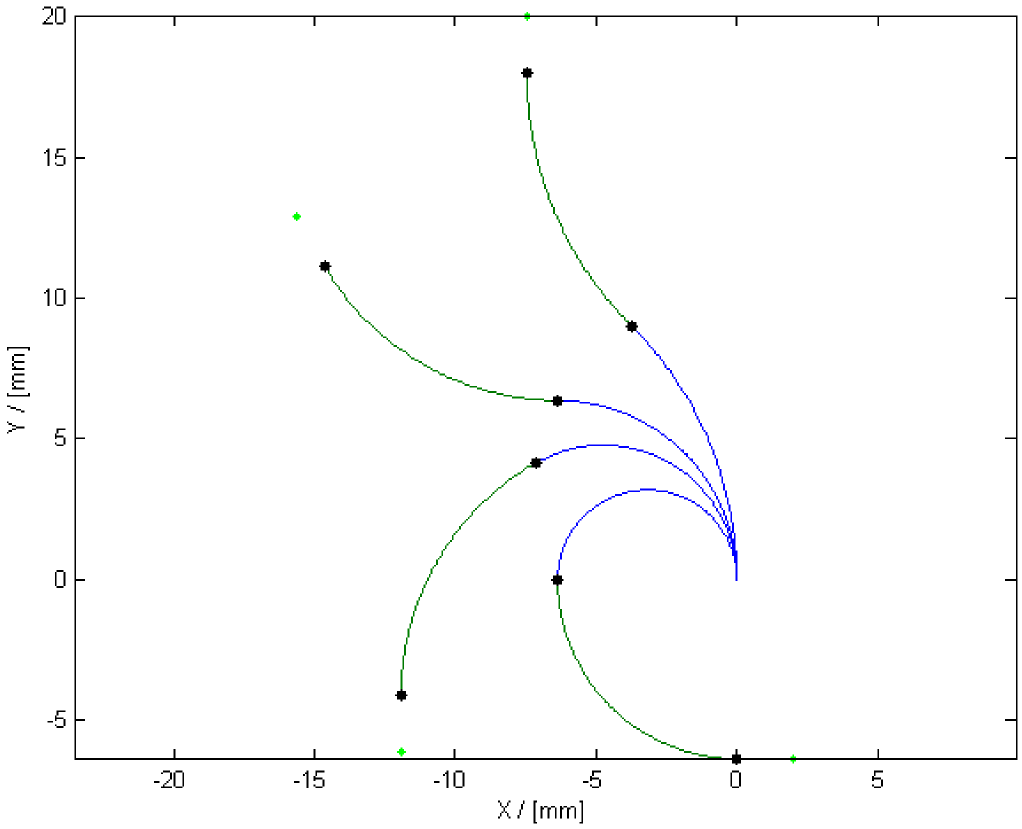
d=1

${}_1L1=$
${}_1L2=$

${}_2L1=$
${}_2L2=$

To Complete:
transcc2D
Project_2Dcc_2seg

“PlotTwoSegments” is given



P2=[2 0]
l1_1=9;
L2_1=11;

l1_2=12;
l2_2=8;

d=1;