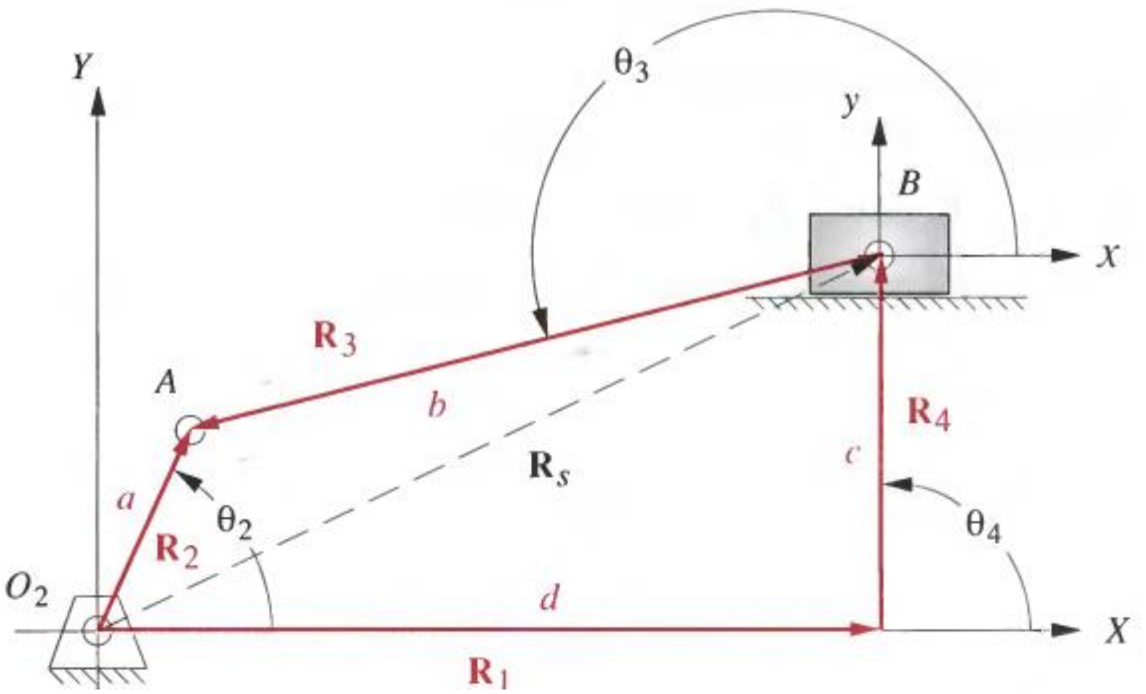
ME3020: Kinematics and Dynamics of Machines (Practical Sessions)
Session: 2

https://www.youtube.com/watch?v=Trn2hmIfxdc

1. Simulate the following slider crank mechanism using MATLAB or Octave. Governing equation are given. Plot the coupler curve for the mid-point of the coupler AB. Link lengths are a=5cm, b=13cm, c=7cm



$$\theta_{3_1} = \arcsin\left(\frac{a\sin\theta_2 - c}{b}\right) \qquad \theta_{3_2} = \arcsin\left(-\frac{a\sin\theta_2 - c}{b}\right) + \pi$$

$$d = a\cos\theta_2 - b\cos\theta_3$$

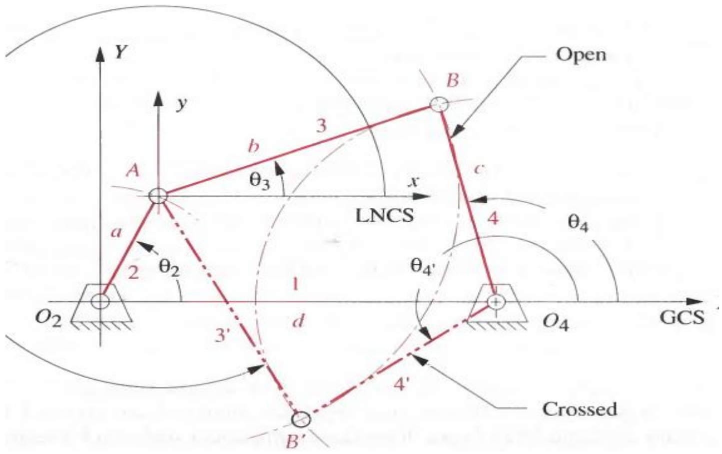
$$A_x = a\cos\theta_2$$

$$A_y = a\sin\theta_2$$

2. Simulate the following four bar mechanism using Matlab or Octave using the governing kinematic equations. Plot the coupler curve for the mid-point of the coupler AB. Link lengths are a= 5cm, b=13cm, c=10cm, d=15cm . Find the Mechanical Advantage for this arrangement.

$$A_x = a\cos\theta_2$$

$$A_y = a\sin\theta_2$$



$$B_x = \frac{a^2 - b^2 + c^2 - d^2}{2(A_x - d)} - \frac{2A_y B_y}{2(A_x - d)}$$

$$B_y = \frac{-Q \pm \sqrt{Q^2 - 4PR}}{2P} \quad Q = \frac{2A_y(d - S)}{A_x - d} \quad R = (d - S)^2 - c^2 \quad P = \frac{A_y^2}{(A_x - d)^2} + 1$$

$$S = \frac{a^2 - b^2 + c^2 - d^2}{2(A_x - d)} \quad \theta_3 = \tan^{-1}\left(\frac{B_y - A_y}{B_x - A_x}\right) \quad \theta_4 = \tan^{-1}\left(\frac{B_y}{B_x - d}\right)$$