JOMO KENYATTA UNIVERSITY OF

AGRICULTURE AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

EMT 2336: Dynamics of Planar Mechanisms - Laboratory Work I

QUESTION

A four bar linkage is required to generate the following function,

$$\theta_4 = 65 + 0.43\theta_2$$

for $15^0 \leq \theta_2 \leq 165^0$. Where θ_2 and θ_4 define the rotation angles of the input and output links respectively. It is further required that the length of the fixed link be $410mm$.

Write a computer program in MATLAB to,

(a) Evaluate the link lengths ratios K_1, K_2 and K_3 using three precision points, and hence determine the lengths of the other links. Use Chebyshev's spacing. Determine the transmission angles for the given range of input angles and at an increment of 5^0, and plot the variation of the transmission angles with the input angles. Comment on the quality of transmission of the linkage.

(b) Evaluate the link lengths ratios K_1, K_2 and K_3 using the least square method for five precision points, and hence determine the length of the other links. Use Chebyshev's spacing.

(c) Calculate the structural errors throughout the given range of input angles and at an increment of 5^0 for the two cases in (a) and (b). Plot the variation of the structural errors as a function of the input angles for the two cases and in the same axis. Comment on the results.