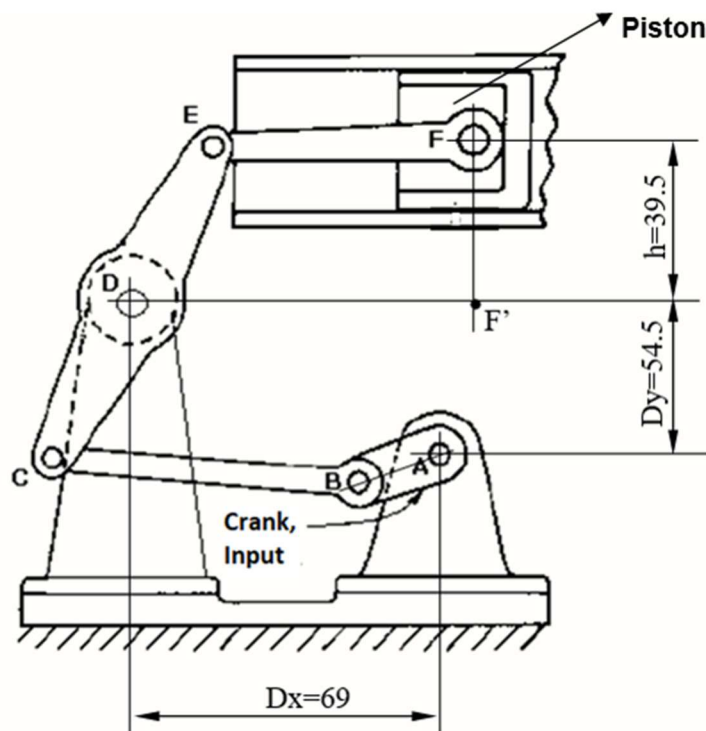


$L2=AB=20$
 $L3=BC=60$
 $L4=CE=80$
 $LCD=CD=40$
 $LDE=DE=40$
 $L5=EF=50$
 $Dx=69$
 $Dy=54.5$
 $h=FF'=39.5$



Step-by-Step Explanation of the Code

1. Physical Parameter Initialization

Lengths of Arms (AB, BC, CD, DE, CE, EF): These variables represent the lengths of various arms in the mechanism, crucial for kinematic calculations.

Coordinates (D_x , D_y): The x and y coordinates of a specific point in the mechanism, likely a joint or pivot point.

Height Parameter (h): A vertical distance or height measurement in the mechanism.

2. Iterative Solver Setup

Maximum Iterations (N_{max}): The upper limit on the number of iterations for the Newton-Raphson method, preventing infinite loops.

Initial Guesses (x): Starting values for the unknown angles (θ_2 , θ_3 , θ_4) and a linear distance (s_1), in radians.

Error Tolerance (x_e): A small value defining the acceptable error margin for the convergence of the solver.

3. System Inputs

Angular Range of θ_1 : The range over which θ_1 varies, signifying the movement of the input arm or lever.

Angular Velocity and Acceleration of θ_1 (w_{θ_1} , acc_{θ_1}): Constant values representing the motion characteristics of the input angle θ_1 .

4. Kinematic Equations and Jacobian Matrix Construction

Iterative Process: For each value in the θ_1 range, the script performs the Newton-Raphson iteration.

Jacobian Matrix (J): A 4x4 matrix crucial for the Newton-Raphson method, representing the partial derivatives of the kinematic equations.

Function f: Represents the kinematic equations, translating the physical relationships into mathematical expressions.

5. Velocity and Acceleration Analysis

Velocity Calculations: Using the Jacobian matrix and the angular velocity of θ_1 , the script calculates the angular velocities of the other components.

Acceleration Calculations: Similarly, it calculates the angular accelerations using the angular acceleration of θ_1 and the previously found angular velocities.

6. Result Visualization

Plotting: The script generates multiple subplots to visualize the relationships between θ_1 and the angular positions, velocities, and accelerations of other components, providing a comprehensive view of the mechanism's motion characteristics.

This code is a sophisticated tool for analyzing mechanical systems. For students, it demonstrates practical applications of kinematics and numerical methods. For experts, it serves as a robust framework for analyzing and visualizing the dynamics of complex mechanisms.