# NOMENCLATURE

- $a_p$: Acceleration of point ‘P’ on coupler
- $a_s$: Acceleration of point ‘S’ on crank
- $a_u$: Acceleration of point ‘U’ on rocker
- $k$: Stiffness matrix of beam element
- $m_2$: Mass of crank
- $m_3$: Mass of coupler
- $m_4$: Mass of rocker
- $u_1, u_2, \ldots, u_6$: Deflection of element in local coordinate system
- $v_p$: Velocity of point ‘P’ on coupler
- $v_s$: Velocity of point ‘S’ on crank
- $v_u$: Velocity of point ‘U’ on rocker
- $A$: Length of crank
- $B$: Length of coupler
- $[C]$: Damping matrix
- $C$: Length of rocker
- $D$: Length of ground link
- DOF: Degree of freedom
- $E$: Modulus of elasticity
- $F_{12}$: Pin joint force between ground link and crank
- $F_{14}$: Pin joint force between ground link and rocker
- $F_{32}$: Pin joint force between coupler and crank
- $F_{43}$: Pin joint force between coupler and rocker
- FE: Finite element
- FEM: Finite element method
\( G \) Number of ground links
\( I \) Mass moment of inertia
\( J \) Number of joints
\( J_1 \) Number of lower pair joints
\( J_2 \) Number of higher pair joints
\([K]\) System stiffness matrix
\( L \) Length of longest link
\( L \) Number of links
\( M \) Bending moments
\([M]\) Mass matrix of beam element
\([M]\) System mass matrix
\( P \) Length of one remaining link
\( Q \) Length of other remaining link
\( \text{RMS} \) Root mean square
\( R_1 \) Vector of ground link
\( R_2 \) Vector of crank (input link)
\( R_3 \) Vector of coupler
\( R_4 \) Vector of rocker
\( S \) Length of shortest link
\( T \) Kinetic energy
\( T_{12} \) Torque required to drive the mechanism
\( U \) Internal strain energy
\( U_1, U_2, \ldots, U_6 \) Deflection of element in global coordinate system
\( \ddot{U}_i \) Rigid body acceleration vector
\( W \) Work done by external forces
\( \alpha_2 \) Angular acceleration of crank
\( \alpha_3 \) Angular acceleration of coupler
$\alpha_4$  Angular acceleration of rocker

$\Pi$  Potential energy

$\mu$  Transmission angle

$\varepsilon$  Strain in link

$\theta_2$  Angle of input link

$\theta_3$  Angle of the coupler

$\theta_4$  Angle of the rocker (output link)

$\rho$  Density of material

$\omega_2$  Angular velocity of crank

$\omega_3$  Angular velocity of coupler

$\omega_4$  Angular velocity of rocker