NOTATIONS AND ABBREVIATIONS

A        Cross sectional area
AR       Aspect ratio
a        Size of element in x-direction
[A]      Co-ordinate matrix
Bccs     Boundary compatibility conditions
b        Size of element in y-direction
$b_{12}, b_{23}, b_{13}$ Coefficients corresponding to equilibrium matrix
[B]      Equilibrium matrix
[B_e]    Basic element equilibrium matrix
[B_f]    Matrix based coordinates of forward end
CCmatrix Product of [C] and [G] matrices in Matlab
CCs      Compatibility conditions
c_{12}, c_{23}, c_{13} Coefficients corresponding to equilibrium matrix
[C]      Compatibility matrix
DDRs     Displacement deformation relations
DR       Displacement ratio
ddof     Displacement degrees of freedom
[D]      Material matrix
[D]_{DIFM} Dual matrix
[D_{ps}] Material matrix for plane strain material
E        Modulus of elasticity
EEs      Equilibrium equations
E_x, E_y Modulus of elasticity along x-and-y directions
FDRs     Force deformation relations
f dof    Force degrees of freedom
{F}      Internal force vector
GJ       Torsional rigidity of member
G_{matrix} [G] matrix in Matlab
\( G_{xy} \)  Shear Modulus in xy plane

\([G]\)  Associated flexibility matrix

\([G_e]\)  Elemental flexibility matrix

\([G_{ps}]\)  Elemental flexibility matrix for plane strain

I  Moment of inertia

\([J]\)  Coefficient matrix equals to \([S^{-1}]^T\)

\([K_g]\)  Geometric stiffness matrix

\([K_{ge}]\)  Geometric element stiffness matrix

L  Length of member

\(L_1, L_2, L_3\)  Shape function in area coordinate system

\([L]\)  Operator matrix

\(M_{DNL}\)  Matrix Product of \([M]\), \([J]\) and \([G]\) matrices

\(M_{DNLM}\)  Direct Nodal Lumping Mass

\(M_{xx}, M_{yy}\)  Moments along x- and y- directions

\(M_{xy}\)  Torsional moment in x-y plane

\(m\)  Number of displacement degrees of freedom

\(m_o\)  Lumped mass

\([M_c]\)  Consistent mass matrix

\([M_L]\)  Lumped Mass Matrix or Mmatrix in Matlab

\(N_x, N_y\)  In-plane forces along x- and y- directions

n  Number of force degrees of freedom

\([N]\)  Shape function matrix

\(P_{cr}\)  Critical buckling load

\(\{P\}\)  \{P\} vector in Matlab

\(\{P\}\)  Load vector

\(q_o(\tau, \theta)\)  Transverse loading on circular plate

\(r\)  Radius in polar coordinate system

\(r, \bar{x}, \bar{y}\)  Coefficients corresponding to respective directions

\(S_{inv}\)  \([S]^{-1}\)

\([S]\)  Global equilibrium matrix

\([S_b]\)  Stability matrix

\([S_{matrix}]\)  \([S]\) matrix in Matlab
\( T \) Torque in the member
\( t \) Thickness of element
\( U \) Internal strain energy
\( u, v \) Nodal displacements along x- and y- directions
\( [Y] \) Stress interpolation function matrix
\( z.cMatrix \) [C] matrix
\( z.cTransposeB \) Product of [C] and [B]\(^T\)
\( [Z] \) Strain linking matrix
\( \alpha \) Coefficient corresponding to angle \( \alpha \)
\( \{\beta\} \) Deformation vector
\( \delta_L \) Extension in the member
\( \{\delta\} \) Displacement Vector
\( \varepsilon \) Strain
\( \theta_x, \theta_y \) Rotations along x– and y directions
\( [\lambda] \) Transformation matrix
\( \phi_{xy} \) Polynomial function
\( \sigma_r \) Radial stress in curved member
\( \sigma_x, \sigma_y \) Stresses in x– and y directions
\( \sigma_\theta \) Tangential stress in curved member
\( \tau_{xy} \) Shear stress in xy plane
\( \gamma \) Poisson’s ratio
\( \omega_{11} \) Frequency of first mode
\( \omega_{IFM} \) IFM based frequency
\( \omega_{exact} \) Exact Value of frequency