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LIST OF SYMBOLS

| | |
|----------------|---|
| A | – cross-section area |
| A_c | – cross-section of the compressed part of the member |
| A_{eff} | – effective cross-section area |
| B | – bimoment |
| b | – I section flange width |
| e_0 | – maximum amplitude of a member imperfection |
| E | – Young's modulus of elasticity |
| E_T | – Young's modulus of elasticity at temperature T |
| \mathbf{F} | – flexibility matrix |
| \mathbf{F}_0 | – equivalent stabilizing force for one braced element |
| F_m | – equivalent stabilizing force for m braced elements |
| f_d | – steel strength |
| f_{dT} | – reduced steel strength at temperature T |
| f_y | – yield strength |
| f_{yk} | – characteristic yield strength |
| G | – shear modulus of elasticity |
| h | – depth of I section or frame storey height |
| H | – total horizontal load or reaction |
| J | – moment of inertia |
| J_0 | – polar moment of inertia |
| J_ω | – warping section constant |
| J_d | – torsion section constant |
| \mathbf{K} | – stiffness matrix |
| \mathbf{K}_G | – initial stress stiffness matrix (geometrical matrix) |
| k | – stiffness of elastic spring |
| k_{br} | – stiffness of bracing element |
| k_v | – stiffness of lateral restraint |
| k_Θ | – stiffness of torsional restraint |
| $k_{\Theta'}$ | – stiffness of warping restraint |
| k_r | – coefficient |
| L | – member length |
| L_0 | – reference effective length |
| l_1 | – brace spacing |
| l_e | – effective length |
| m | – number of restrained members or half-waves of buckling mode |
| M | – bending moment |
| M_s | – torque |
| M_t | – Saint-Venant torsional moment |
| M_ω | – warping torque |
| N | – normal force |
| N_c | – normal force in the compressed part of the member |
| N_{cr} | – critical axial compression force |
| N_{Rc} | – load-bearing capacity of column cross-section |
| $N_{b,Rd}$ | – design buckling resistance |
| $N_{o,Rd}$ | – design local buckling resistance |
| p | – load per unit length |
| P | – external load |

| | |
|-----------------------|---|
| P_{cr} | – critical load |
| P_{br} | – axial load-carrying capacity of column non-sway buckling mode |
| P_{ubr} | – axial load-carrying capacity of column sway buckling mode |
| q | – equivalent stabilizing load per unit length |
| r_0 | – radius of gyration $r_0 = \sqrt{J_0 / A}$ |
| R_w | – residual stress constant |
| t_f | – thickness of I section flange |
| t_w | – thickness of I section web |
| T | – shear force or cross-section temperature |
| u | – design variable |
| \mathbf{u} | – design variables vector |
| v | – displacement in direction y |
| v_0 | – amplitude of imperfection in direction y |
| V | – total potential energy or total vertical load |
| \mathbf{z} | – nodal displacement vector |
| α | – ratio, factor or coefficient of bracing stiffness |
| α_m | – reduction factor for m restrained members |
| γ | – partial safety factor, ratio |
| $\delta(\dots)$ | – first variation of (...) |
| δ_i | – displacement at i |
| η | – coefficient |
| Θ | – twisting angle of the cross-section |
| κ | – torsion parameter $\kappa = \sqrt{GJ_d / EJ_\omega}$ |
| λ | – slenderness ratio or Lagrangian multiplier |
| $\bar{\lambda}$ | – relative slenderness ratio |
| $\Lambda_{P_{cr}, u}$ | – under-integral sensitivity function of P_{cr} due to variation of u |
| μ | – buckling length factor |
| ν | – Poisson ratio |
| σ_{res} | – residual stresses |
| σ_1 | – residual stresses parameter |
| σ_2 | – residual stresses parameter |
| σ_c | – residual stresses parameter |
| x, y, z | – coordinate axes |
| φ | – angle, ratio or factor |
| φ_T | – reduced stability coefficient at temperature T |
| ψ_F | – inclination of unbraced frame |
| ψ_{Fbr} | – inclination of braced frame |