NOTATION

Quantity	*Symbol*	*SI Unit*
Angle	$\alpha, \beta, \theta, \gamma, \phi$	rad (radian)
Length	L, s	m (metre) mm (millimetre)
Area	A	m^2
Volume	V	m^3
Time	t	s (second)
Angular velocity	ω	rad/s
Velocity	v	m/s
Weight	W	N (newton)
Mass	m	kg (kilogram)
Density	ρ	kg/m^3
Force	F or P or W	N
Moment	M	Nm
Pressure	P	Pa (Pascal) N/m^2 bar (= 10^5 N/m^2)
Stress	σ	N/m^2
Strain	ε	–
Shear stress	τ	N/m^2
Shear strain	γ	–
Young's modulus	E	N/m^2
Shear modulus	G	N/m^2
Bulk modulus	K	N/m^2
Poisson's ratio	ν	–
Modular ratio	m	–
Power	–	W (watt)
Coefficient of linear expansion	α	m/m°C
Coefficient of friction	μ	–
Second moment of area	I	m^4
Polar moment of area	J	m^4
Product moment of area	I_{xy}	m^4
Temperature	T	°C
Direction cosines	l, m, n	–
Principal stresses	$\sigma_1, \sigma_2, \sigma_3$	N/m^2
Principal strains	$\varepsilon_1, \varepsilon_2, \varepsilon_3$	–
Maximum shear stress	τ_{max}	N/m^2
Octahedral stress	σ_{oct}	N/m^2

Quantity	*Symbol*	*SI Unit*
Deviatoric stress	σ'	N/m^2
Deviatoric strain	ε'	–
Hydrostatic or mean stress	$\bar{\sigma}$	N/m^2
Volumetric strain	Δ	–
Stress concentration factor	K	–
Strain energy	U	J
Displacement	δ	m
Deflection	δ or y	m
Radius of curvature	ρ	m
Photoelastic material fringe value	f	N/m^2/fringe/m
Number of fringes	n	–
Body force stress	X, Y, Z F_R, F_θ, F_Z	N/m^3
Radius of gyration	k	m
Slenderness ratio	L/k	–
Gravitational acceleration	g	m/s^2
Cartesian coordinates	x, y, z	–
Cylindrical coordinates	r, θ, z	–
Eccentricity	e	m
Number of coils or leaves of spring	n	–
Equivalent J or effective polar moment of area	J_{eq} or J_E	m^4
Autofrettage pressure	P_A	N/m^2 or bar
Radius of elastic-plastic interface	R_p	m
Thick cylinder radius ratio R_2/R_1	K	–
Ratio elastic–plastic interface radius to internal radius of thick cylinder R_p/R_1	m	–
Resultant stress on oblique plane	p_n	N/m^2
Normal stress on oblique plane	σ_n	N/m^2
Shear stress on oblique plane	τ_n	N/m^2
Direction cosines of plane	l, m, n	–
Direction cosines of line of action of resultant stress	l', m', n'	–
Direction cosines of line of action of shear stress	l_s, m_s, n_s	–
Components of resultant stress on oblique plane	p_{xn}, p_{yn}, p_{zn}	N/m^2
Shear stress in any direction ϕ on oblique plane	τ_ϕ	N/m^2
Invariants of stress	I_1 I_2 I_3	N/m^2 $(N/m^2)^2$ $(N/m^2)^3$
Invariants of reduced stresses	J_1, J_2, J_3	
Airy stress function	ϕ	–

Quantity	*Symbol*	*SI Unit*
'Operator' for Airy stress function biharmonic equation	∇	–
Strain rate	$\dot{\varepsilon}$	s^{-1}
Coefficient of viscosity	η	
Retardation time (creep strain recovery)	t'	s
Relaxation time (creep stress relaxation)	t''	s
Creep contraction or lateral strain ratio	$J(t)$	–
Maximum contact pressure (Hertz)	p_0	N/m^2
Contact formulae constant	Δ	$(N/m^2)^{-1}$
Contact area semi-axes	a, b	m
Maximum contact stress	$\sigma_c = -p_0$	N/m^2
Spur gear contact formula constant	K	N/m^2
Helical gear profile contact ratio	m_p	–
Elastic stress concentration factor	K_t	–
Fatigue stress concentration factor	K_f	–
Plastic flow stress concentration factor	K_p	–
Shear stress concentration factor	Kt_s	–
Endurance limit for n cycles of load	S_n	N/m^2
Notch sensitivity factor	q	–
Fatigue notch factor	K_f	–
Strain concentration factor	K_ε	–
Griffith's critical strain energy release	G_c	
Surface energy of crack face	γ	Nm
Plate thickness	B	m
Strain energy	U	Nm
Compliance	C	mN^{-1}
Fracture stress	σ_f	N/m^2
Stress Intensity Factor	K or K_1	$N/m^{3/2}$
Compliance function	Y	–
Plastic zone dimension	r_p	m
Critical stress intensity factor	K_{IC}	$N/m^{3/2}$
"J" Integral	J	
Fatigue crack dimension	a	m
Coefficients of Paris Erdogan law	C, m	–
Fatigue stress range	σ_r	N/m^2
Fatigue mean stress	σ_m	N/m^2
Fatigue stress amplitude	σ_a	N/m^2
Fatigue stress ratio	R_s	–
Cycles to failure	N_f	–
Fatigue strength for N cycles	σ_N	N/m^2
Tensile strength	σ_{TS}	N/m^2
Factor of safety	F	–

Quantity	*Symbol*	*SI Unit*
Elastic strain range	$\Delta\varepsilon_e$	–
Plastic strain range	$\Delta\varepsilon_p$	–
Total strain range	$\Delta\varepsilon_t$	–
Ductility	D	
Secondary creep rate	ε_s^0	s^{-1}
Activation energy	H	Nm
Universal Gas Constant	R	J/kgK
Absolute temperature	T	°K
Arrhenius equation constant	A	–
Larson–Miller creep parameter	P_1	
Sherby–Dorn creep parameter	P_2	
Manson–Haford creep parameter	P_3	
Initial stress	σ_i	N/m^2
Time to rupture	t_r	s
Constants of power law equation	β, n	–