

Subject Index

A

ABAQUS, 126
 Aeropropulsion materials, 382
 AISI 1015, 323
 2124 aluminum alloy metal matrix composite, 54
 ANSYS finite-element code, 382
 Attachment methods, 382
 Axial fatigue, 281
 Axial-torsional load effects, Haynes 188, 99

B

Biaxial fatigue
 effect of periodic overloads, 213
 in- and out-of-phase combined bending-torsion,
 246
 isothermal model, 266
 microcrack growth, 323
 Biaxial isothermal fatigue model, 266
 Biaxial loading, in-plane, 369, 405
 Biaxially loaded cruciform-shaped specimen, 41
 Biaxial strain ratio, 355
 Biaxial strength testing, isotropic and anisotropic
 monoliths, 13
 Biaxial testing, 423
 in-plane, 382

C

Ceramics, 13
 Cobalt-base superalloy, 99, 188, 281
 Cold forming, stainless steel, 26
 Combined loading, 191
 Complex loading, 126
 Composite materials, 423
 Composite strength, 3
 Compression testing, 405
 Constitutive equations, 126
 Crack closure, effect of periodic overloads, 213
 Crack face interface, effect of periodic overloads, 213
 Crack growth
 in- and out-of-phase combined bending-torsion,
 246
 rate model, 305
 Cracking behavior, effect of periodic overloads, 213
 Crack initiation
 high-cycle fatigue, 139
 in- and out-of-phase combined bending-torsion,
 246
 Crack propagation
 multiaxial high-strain fatigue, 355
 multiaxial low-cycle fatigue, 340

Critical plane, 305
 Critical plane approach, 173, 191
 Crossland fatigue criteria, 139
 Cruciform, 355, 369, 382, 405
 thickness-tapered, 423
 Crystals, single, 13
 Cumulative fatigue, 281
 Cyclic hardening, 281
 Cyclic loading, 126
 Cyclic plasticity, 54
 Cyclic testing, 369

D

Damage curve approach, 281
 Deep drawing, 405
 Deformation, 369, 405
 metal matrix composite, 54
 Displacement, isotropic and anisotropic monoliths,
 13
 Dissipation potential, 99

E

Effective fatigue, 305
 Effective intensity factor range, 305
 Elastic-plastic notch tip stresses, 82
 Elastic-plastic strain analysis, 82
 Elasto-viscoplastic material, 126
 Electromechanical testing facility, 423
 Energy, 305
 Extensometer, in-plane biaxial contact, 369
 External pressure, 355

F

Failure envelope, 423
 Failure loads, 26
 Failure surface, 423
 Failure theories, 3
 Fatigue criteria, 232
 Fatigue life prediction, 139
 Fatigue lifetime prediction
 combined tension-torsion in- and out-of-phase,
 232
 cumulative axial and torsional, 281
 effect of periodic overloads, 213
 in- and out-of-phase combined bending-torsion,
 246
 under multiaxial random loading, 157
 welded joints, 191
 Fiber metal laminate, 405

Finite-element analysis
 in-plane biaxial loading, 382
 non-linear problems, 126
 Fracture, metal matrix composite, 54

G

G-10 composite laminate tube, 3
 Generalized strain energy density crition, 173
 Glass fiber-reinforced epoxy laminate, 3
 Grain boundaries, effect on microcrack growth, 323

H

Haynes 188, 281
 axial-torsional load effects, 99
 High-cycle fatigue prediction, 139
 Hoop compression, 3
 Hypothesis of the integral approach, 157

I

Inelastic deformation, under multiaxial stress, 41
 Influencing parameters, 157
 In-plane biaxial contact extensometer, 369
 In-plane biaxial failure surfaces, 26
 In-plane biaxial loading, 405
 In-plane biaxial testing, 382
 Integral approach, 173, 191
 Internal pressure, 355

K

Kinematic hardening, 54

L

Laminate tube, strength, 3
 Linear damage rule, 281
 Load-type sequencing, 281
 Low-cycle fatigue, 355

M

Mean stress effect, 305
 Metal matrix composite
 characterization methods, 41
 deformation and fracture, 54
 Microcrack growth
 modes, 340
 modelling, 323
 propagation rate, 340
 Modal control, 355

Modeling

inelastic deformation under multiaxial stresses, 41
 microcrack growth, 323
 Monoliths, isotropic and anisotropic, 13
 Multiaxial fatigue, 213
 in- and out-of-phase combined bending-torsion,
 246
 in-plane biaxial contact extensometer, 369
 Multiaxial fatigue criteria, 157
 energy-based, 173
 Multiaxial fatigue life model, 305
 Multiaxial high-strain fatigue, 355
 Multiaxial loading, 99
 G-10 composite laminate tube, 3
 high-cycle fatigue prediction, 139
 weld joints, 191
 Multiaxial low-cycle fatigue, microcrack growth
 modes and propagation rate, 340
 Multiaxial strength, isotropic and anisotropic
 monoliths, 13
 Multiaxial stress, inelastic deformation, 41
 Multiaxial stress-strain notch analysis, 82

N

Newton algorithm, 126
 Nickel aluminate, 13
 Non-linear problems, 126
 Nonproportional loading, high-cycle fatigue
 prediction, 139
 Nonradial loading
 metal matrix composite, 54
 silicon carbide, 54
 Notched specimen, in- and out-of-phase combined
 bending-torsion, 246
 Numerical algorithm, 126
 Numerical method, 139

O

Off-axis tension tests, 41
 Optimization techniques, 382
 Out-of-phase loading effects, 139
 Overloads, periodic, 213

P

Phase difference, 157
 Phase factors, 266
 Plastic limit load, 405
 Prediction software, 191
 Proportional loading, 213
 Prototype fixturing, 382

R

Random load, 157
 nonproportional, 173

Ratcheting, 54
 Residual stress, 232
 Reusable fixturing, 382
 Riveted joint, 405

S

Sequence effects, 213
 Shear energy, 305
 Shear plane, multiaxial low-cycle fatigue, 340
 Shear stress amplitude, effective, 139
 Silicon carbide particulate, 54
 Sines fatigue criteria, 139
 Stainless steel, 26
 austenitic, biaxial isothermal fatigue model, 266
 Steel
 biaxial fatigue, 213
 combined tension-torsion in- and out-of-phase, 232
 effect of periodic overloads, 213
 microcrack growth modes and propagation rate, 340
 Strain
 isotropic and anisotropic monoliths, 13
 principal, 340
 Strain hardening, 305
 Strain measurement, 369
 Strain paths, in- and out-of-phase, 305
 Strain rates, equivalent, 99
 Strain rate vectors, 99
 Stress
 effect of periodic overloads, 213
 equivalent, 26, 99
 in- and out-of-phase combined bending-torsion, 246
 isotropic and anisotropic monoliths, 13
 superimposed mean, 157
 Stress intensity factor, 405
 Stress relaxation, 99
 Superalloy, 99
 System design, multiaxial high-strain fatigue, 355

T

Temperature, elevated, 369
 Tension, combined in- and out-of-phase, 232
 Tension-torsion loading, 213
 Thermomechanical fatigue, 355
 Thermomechanical loading, 266
 Thin-walled tube, 355
 Torsion, 355
 combined in- and out-of-phase, 232
 in- and out-of-phase, 246
 Torsional fatigue, 281
 Torsion stress, 3
 Triaxiality factor, 266
 Triaxial testing facility, 423
 Tungsten carbide, 13

U

Unidirectional fiber-reinforced metal matrix composites, 41

V

Variable-amplitude tests, 157
 Viscoplasticity, 99
 models, potential-based, 99

W

Weakest-link model, 232
 Weld joints, under multiaxial loading, 191

Y

Yield surface, 405

Z

Z-parameter, 266