

Subject Index

17-4 PH stainless steel, 598
316 LN stainless steel, 524

A

A533 Grade B steel, 651
Aircraft fuselage structures, 233
Alumina, 510
Aluminum alloy, 192
Aluminum microstructure models, 715
API 5L X70 steel, 176
ASTM A 723, 116
ASTM E 1921, 307, 691
Asymptotic solution, 270

B

Bend specimens, 426
Brittle fracture, 288
 infinite plate, 741
Burst pressure, 176

C

Cannon bore coatings, 101
Cannon tube, 101
Cell model predictions, 176
Ceramic materials, fracture toughness
 measurement, 757
Charpy specimens, precracked, 689
Cleavage, 3, 307
Cleavage fracture modeling, 360
Closure mechanisms, 619
Cohesive zone model, 717
Compact tension specimens, 445
Compressive underloads, 557
Constant maximum stress test, 493
Constant minimum stress test, 493
Constraint, 209, 288, 328
Constraint effect, 270
Continuing crack growth, 3
Corrosion fatigue, 598
Crack arrest, 729
Crack closure, 631
Cracked round bar, 651
Crack-front field, 270
Crack front shape, 573

Crack growth, 176, 510
 threshold, 129
Crack growth rate, 116
 uncertainty analysis, 445
Crack growth resistance, 176
Crack growth retardation, 458
Crack initiation, 57
Crack length ratio, effect on reference
 transition temperature, 307
Crack mouth opening displacement, 445
Crack opening displacement, 741
Crack opening stress, 493, 631
Crack path, 3
Crack propagation, 57
Crack shape, evolution, 573
Crack-tip constraint, 176
Crack-tip fields, 233, 288
Crack tip opening angle, 3
Crack tip opening displacement, 3
Crack tip stress, 407
Creep crack growth, 407
Critical plane, 192
Crossland theory, 192
Cyclic stress strain relationship, 493, 633

D

Damage evolution, 147
Defects, 57
Direct current potential difference, 129
Dislocation-based model, 672
Dislocation distribution, 741
Ductile fracture, 176, 307
Ductile materials, 233
Ductile-to-brittle region, 651
Ductile-to-brittle transition, 307
Dynamic fracture toughness, 651

E

Effective strain life curve, 493, 633
Eigenstrain, 360
Elastic-plastic, 3
Elastic-plastic contact finite element
 analysis, 192
Elastic-plastic material, 270
Electrochemical fatigue sensor, 129

Electrohydraulic machine, 524
 Environmental fracture, 116
 Equivalent life, 633
 Equivalent stress, 633
 Experimental observations, 573
 Explosion bulge, 209
 Explosion Bulge/Explosion Crack Starter
 test, 209

F

Fabricated metallic structures, 385
 Fabrication history effects, 385
 Fatigue, 524
 Fatigue crack closure, 493, 617, 631
 Fatigue crack growth, 510, 557
 Fatigue crack life, predictions, 573
 Fatigue cracks
 initiation, 715
 non-planar, 573
 propagation, 445
 Fatigue life, 573
 Ferritic steels, 360, 672, 729
 Finite element analysis, 3, 161, 176, 192,
 270, 328, 407, 426
 Fractography, 557
 Fracture, 73, 385
 Fracture mechanics, 3, 129, 458
 FRANCD, 573
 moment frame connections, 57
 surface-cracked plates, 288
 Fracture path, 57
 Fracture predictions, 426
 Fracture process zone, 510
 Fracture testing, 328
 Fracture toughness, 209, 288, 689
 A533B steel, 307
 HSLA-65 welds, 209
 measurement method, 757
 SINTAP project, 73
 steels in transition region, 672
 undermatched welds, 328
 welds, 426
 Fracture toughness scaling model, 653
 FRANC3D, 573
 Frequency effect, 598

G

Gamma factor, 328
 Gas turbine blade, 147
 Goodman diagram, 476
 Grain boundary decohesion, 715
 Griffith-Orowan equation, 672

H

Haigh diagram, 476
 Heat affected zone, 407
 Helicopter rotor hubs, 458
 Hertz analytical displacement field, 161
 High cycle fatigue, 129, 476
 High strength steel, 101
 Hole, 3
 HSLA-65, 209
 Hydrogen cracking, 101
 modeling, 116

I

Infrared thermal imaging, 129
 Initial crack growth, 3
 Initiation fatigue approach, 493, 633
 Interference fit joints, 192

J

Jasper equation, 476
J-integral, 270
 critical value, 426
 J-R curves, 328

K

K-dominance, 288
 Kinked cracks, 741

L

Lifetime assessment, 147
 Linear elastic, 3
 Load history, 129
 Load interaction effects, 458
 Load ratio effect, 598
 Local compression, 426
 Long crack thresholds, 129

M

Martensite packet, 458
 Master curve, 209, 307, 651, 672, 691, 731
 Materials Properties Council
 cooperative test program, 689
 McDiarmid theory, 192
 Mean stress, 493
 Metallic materials, fracture toughness
 measurement, 757
 Micromechanics model, 360
 Microstructure models, 715
 Mismatch weld joints, 328
 Mixed mode, 3, 233
 Mixed-mode fatigue, 573
 Mixed mode fracture, 757
 Mode I crack extension, 176
 Modeling, cleavage fracture, 360
 Modified boundary layer solutions, 288
 Moment-frame connections, 57
 Moment resistant frames, 360
 Multiaxial fatigue, 631
 analysis, 192

N

Neuber theory, generalized, 192
 Non-linear elastic, 3
 Non-planar fatigue cracks, 573
 Northridge earthquake, 57, 360
 Numerical predictions, 573

O

Octahedral stress parameter, 192
 Overloads, 129, 458, 557, 633

P

Penny-shaped crack, 161
 PH13-8Mo stainless steel, 458
 Pipelines, 176
 Plane-strain analysis, 176
 Plane stress, 233
 Plastic, fully, 3
 Plastic collapse, 73
 Plastic deformation, 233
 Plastic eta factor, 328

Plasticity, 619
 local, 328
 Plastic zone length, 233
 Plate stock, residual stresses, 385
 Polycrystals, 717
 Power law, 3
 Pressure vessel, hydrogen cracking, 116
 Pressurized thermal shock, 729
 Probabilistic risk assessment, 729

R

Railway wheel, 161
R-curve, 176
 Reactor pressure vessel steel, 651
 Reference temperature, 209, 307, 651
 Residual crack opening, 510
 Residual strength assessment, 233
 Residual stress, 101, 360, 385, 426, 493
 RKR micromechanical model, 426
 Rolling contact load, 161
 Roughness, 619
 Round-robin program, 426
 RPV steel, 524

S

SAE 1045 steel, 493, 631
 Scaling models, 209
 Seismic loading, 57, 360
 Short cracks, 328
 SINTAP, 73
 Size effect, 757
 Slip line fracture, 3
 Small cracks, 129
 growth behavior, 458
 Spiral notch test, 757
 Stainless steel, 458, 598
 Strain hardening, 672
 Strength, 73
 Strength-strain criterion, 672
 Stress, 57
 mean, 476
 singularities, 741
 Stress fields, 270
 constraint-corrected, 288
 crack-tip, 233

Stress intensity factor ranges, 445
 Stress ratio, 476
 Stress relief annealed specimens, 129
 Stress triaxiality, 233
 Structural integrity, 73
 Structural performance-based material screening, 209
 Subsurface cracks, 161
 Super alloy, coated, 147
 Superposition, 741
 Surface-cracked plates, 288

T

Temper, effect on corrosion fatigue behavior, 598
 Temperature effects, 557
 Temperature evolution, 524
 Tensile overloads, 557
 Tensile properties, 672
 Thermal and mechanical fatigue testing, 147
 Thermal barrier coatings, 101, 147
 Thermal stress, 101, 192
 Thermography, 524
 Thermomechanical fatigue loading, 147
 Thermo-mechanical model, 101
 Three dimensional, 270
 Threshold, 129, 617
 Ti-62222, 557
 Ti-6Al-4V, 129, 476
 Titanium alloy, 557
 Torsion bar testing, 757
 Toughness scaling, 209
 Transient loads, 557
 Transition region, 672
 Transition temperature, 651

Triaxial stress, 233
 Two-parameter characterization, 288

U

Uncertainty analysis, 445
 Underloads, 557
 Undermatch welds, 328
 Uniaxial crack-closure analysis, 631

V

Void, 3
 von Mises' yield criterion, 631

W

Wake fracture process zone, 510
 Wedge, 743
 Weibull modulus, 307
 Weibull stress, 209, 360
 Welded fracture, 360
 Welded joints, 73
 Welded steel moment-frame buildings, 57
 Weld fabrication, 385
 Weld fracture toughness, 426
 Weld fusion margin, 328
 Weld joint geometry, 328
 Weld metal, 426
 Weld mismatch, 328
 Weld modeling, 385
 Welds, 328, 385

X

X20CrMoV 12 1 steel, 407

Z

Zerilli-Armstrong constitutive equation, 672