

Subject Index

A

- A302B steel, 305
- Aircraft components, 445
 - multiple site dams, 486
- Aircraft engine, compressor disks, 391
- Aluminum alloys, crack growth modeling, 475
- ANSYS, 206
 - stress intensity predictions, 371
- ASTM E 1737, 165
- ASTM E 1820, 183
- ASTM E 1921, 305
- Asymptotic solution, 165

B

- Basis function, 331
- Biaxial fatigue, irregular loading, 79
- Biaxial loading, 242, 391
- Bonded interface, 526
- Bonded patch repair, 505
- Boundary element analysis, 3D, 505
- Branched cracks, 331
- Brittle fracture, structural, 271
- Buckling, 486
- Bulk property evaluation, thermal barrier coating, 143

C

- Cleavage fracture, 242
- Cohesive energy, 475
- Cohesive strength, 475
- Cohesive zone model, 475
- Compressor disks, surface cracks, 391
- Constitutive behavior, 143
- Constraint, 39
 - surface-cracked plates, 206
- Constraint effect, 165
- Contoured double cantilever beam specimen, 526
- Crack closure, 39
- Crackface tractions, 331
- Crack growth, 3, 39, 457
 - ductile, 165
 - J*-controlled, 165
 - modeling, 475
 - riveted lap-splice joints, 486
 - threshold stress intensity, 445
 - time-dependent, 405

Crack propagation, 505

- Cracks
 - branched, 331
 - complex geometry, 348
 - kinked, 110, 331, 371
 - nonlinear stress fields, 348
 - part-through, 206, 221
 - small, 427
 - surface, 206, 221
- Crack-tip field approach, 54
- Crack-tip-opening angle, 475
 - riveted lap-splice joints, 486
- Crack-tip opening displacement, 371, 391
 - critical, 271
- Cruciform bend specimen, shallow-flaw, 242
- Cyclic hardening, 94
- Cyclic hysteresis, 143

D

- da/dN versus ΔK curves, 3
- Damage, incremental, 67
- Damage cracking, multiple-site, 486
- Damage curve approach, 94
- Damage parameter, 67
- Deformation limits, 183
- Direct current potential difference, 427
- Dislocation
 - density distributions, 331
 - mechanics, 318
- Dissimilar material adherends, 526
- Ductile crack growth, 165
- Dynamic fracture toughness, 271

E

- Eigenstrain, 128
- Elastic-plastic finite element analysis, 206
- Elastic-plastic fracture mechanics, Irwin's contributions, 54

F

- Facets, 110
- Fatigue
 - incremental method, 67
 - strain-based method, 67
- Fatigue damage event, 67
- Fatigue life prediction, *see* Life prediction
- Fatigue strength, 457

Ferritic steels, 183
 Fiber-reinforced plastics, 526
 Finite element method, 128
 crack growth, 475
 3D model, 391
 3D dynamic FEM, 271
 Flow stress, 67
 Fracture mechanics, 39, 427, 457
 Irwin's contributions, 54
 surface cracks, 391
 Fracture toughness, 165
 biaxial effect, 242
 cleavage, 183
 constraints, 183
 dynamic evaluation, 271
 testing, 183
 transition behavior, 318
 transition testing, 305

H

Haynes 188, cumulative fatigue behavior, 94
 High cycle fatigue threshold, 427
 Hybrid material adherends, 526
 Hydrostatic stress criterion, 242

I

Inclusions, 110
 In-phase, 67
 Inverse problem, 128
 Irwin, George R.
 contributions to elastic-plastic fracture mechanics, 54
 stress intensity factor, 39, 54

J

J-A₂ curve, 165
J-R curve, 165

K

Kandil-Brown-Mill parameters, 79
 Kinked cracks, 110, 331
 stress intensity predictions, 371

L

Lap-splice joints, 486
 Life prediction
 basic methodology, 3
 cumulative cyclic loading, 94

kinked cracks, 110
 Linear damage rule, 94
 Linear elastic fracture mechanics methods, 405
 Loading
 cumulative cyclic, 94
 history, 427
 program, 457
 variable amplitude, 79
 Local approach, 271
 Low cycle fatigue, 110
 cracks, 427

M

Master curve, 318
 Microcracking, directionality, 143
 Miner-Palmgren rule, 79
 Mode 1 fracture, 526
 Moisture effect, 526
 Multiaxial rainflow, 67
 Multiple site dama, 486

N

Nickel alloy, 445
 Nickel base alloys, time-dependent crack growth, 405
 Nondestructive evaluation, computer-aided, 128
 Notched round bars, transition fracture toughness testing, 305

O

Out-of-phase, 67
 Overhead traveling crane, 457
 Overloads, 427

P

Part-through cracks, 206, 221
 Plasma-sprayed coatings, 143
 Plasticity, 39
 Plastic yielding, 391
 Plastic zone, bolt hole, 391
 Plastic zone size, 221
 surface-cracked plates, 206
 Powder metallurgy, 110
 Pressure vessels, 242
 fracture toughness transition, 318
 Pressurized cylindrical shell, 505

R

- Rainflow, 67, 457
 Rainflow cycle counting, 79
 Rate-temperature parameter, 271
 Rayleigh-Ritz method, 526
 Residual stress, 457
 welding, nondestructive evaluation, 128
 Rivets, 486

S

- Semi-elliptical surface flaw, 371
 Shallow-flaw cruciform bend specimen, 242
 Size requirements, 183
 Slice synthesis methodology, 221
 Smith-Watson-Topper parameter, 79, 94
 S-N curves, 3
 STAGS shell code, 486
 Stainless steel 304
 biaxial fatigue, 79
 Steel, structural, 271
 Strain, 3
 mean, 94
 Strain-life curves, 3
 Stress, 3
 concentration, 457
 mean, 94
 nonlinear fields, 348
 Stress effect, mean, 67
 Stress intensity, 427
 ANSYS predictions, 371
 threshold, 445
 Stress intensity factor, 331, 505
 cracks of complex geometry, 348
 effective, 457
 Irwin's, 39, 54
 surface cracks, 391
 Strip-yield model, 221
 Superalloy, 94, 110
 Superposition, 331

- Surface-cracked plates, under tension or bending loads, 206
 Surface cracks, 206, 221
 compressor disks, 391
 small, 445
 Surface flaw, semi-elliptical, 371
 Swedlow Memorial lecture, 3

T

- Tearing modulus, 165
 Thermal barrier coating, bulk property evaluation, 143
 Ti-6Al-4V, small, 427
 Titanium alloy, 445
 Transition fracture toughness testing, 305
 T-stress, 39
 Turbine engines, 427
 time-dependent crack growth, 405

U

- U720, 110
 Uniaxial rainflow counting algorithm, 67

W

- Wedge, 331
 Weibull stress, 242, 271
 Weight functions, 221, 348, 391
 Weld, reinforcement removal, 128
 Welding residual stress, nondestructive evaluation, 128
 Weld metals, 271
 Weld repair specimens, fatigue strength, 457
 Wood, 526

Z

- Zirconia, 143