

# Subject Index

## A

Aircraft  
 structural integrity, 220  
 structural life analysis, 220  
 tires, cumulative fatigue damage, 67  
 Aluminum alloy, crack propagation, 86  
 Amplitude, variable, coiled tubing, 283  
 Anticlastic bending, 161

## B

B-2 bomber, structural life analysis, 220  
 Biaxial ratcheting, 283  
 Biaxial stress cycling, 161  
 Bismaleimide, thermomechanical fatigue, 39  
 Bridging fiber stress, titanium metal matrix composites, 24  
 Bush-lug interference, 248

## C

Closure factor, 220  
 Constant closure model, 220  
 Cord-rubber composites, cumulative fatigue damage, 67  
 Crack closure  
 aircraft, 220  
 measurement, life predictions, 202  
 plasticity-induced, 116  
 Crack-closure model, fatigue behavior, notched components, 116  
 Crack growth  
 aircraft, 220  
 IN-718 material, biaxial stress bending, 161  
 lugs under spectrum loading, 248  
 Crack growth rate  
 as function of stress intensity factor, 100  
 short cracks, 188  
 small, life predictions, 202  
 Crack propagation, 116  
 fatigue damage model, 86  
 notched components, 116  
 resistance spot weld connections, 265  
 Cracks  
 multiple, notch root fatigue, 136

notch root fatigue, 136  
 nucleation, 188  
 part-through, 248  
 short, behavior modeling, 188  
 shape, life predictions, 202  
 Creep, titanium metal matrix composites, 24  
 Cross-ply laminates, thermomechanical fatigue, 39  
 Cumulative damage  
 angle-ply fiber-reinforced elastomer composites, 67  
 coiled tubing, 283  
 prestraining, 328  
 Cyanate ester, thermomechanical fatigue, 39  
 Cyclic loading, numerical simulation, 86

## D

Damage accumulation hypothesis, 305  
 Damage tolerance, 202  
 Database lifing, 202  
 Debonding, fiber-matrix, 67  
 Delamination, angle-ply fiber-reinforced elastomer composites, 67  
 Distribution function, estimation, 305  
 Dominant damage model, 1  
 Dugdale strip-yield model, Newman's modified, 116

## E

Elastomers  
 angle-ply fiber-reinforced, cumulative fatigue damage, 67  
 cumulative fatigue damage, 67  
 Elevated temperature, thermomechanical fatigue life, 1

## F

FALSTAFF spectrum loading, 136, 248  
 Fatigue crack growth rate, titanium metal matrix composites, 24  
 Fatigue damage model, crack propagation, 86

Fatigue prediction, based on computational fracture mechanics, 100  
 Fiber bridging, titanium metal matrix composites, 24  
 Fiber strength, titanium metal matrix composites, 24  
 Finite element analysis  
     bridging fiber stress, 24  
     crack propagation, 86  
     fatigue prediction, 100  
     notch plastic stretches, 116  
     resistance spot weld connections, 265  
 Finite element mesh, discretization, 86  
 Fractography  
     crack growth, 248  
     notch root fatigue cracks, 136  
 Fracture mechanics  
     computational, 100  
     near- $\alpha$  titanium alloy, 188  
 Frictional shear stress, titanium metal matrix composites, 24

**H**

Hysteresis energy, 305

**I**

IN-718 material, crack propagation, 161

**L**

Life prediction  
     angle-ply fiber-reinforced elastomer composites, 67  
     coiled tubing, 283  
     crack propagation based, 202  
     prestraining, 328  
     random loading process, 305  
     resistance spot weld connections, 265  
 Linear damage rule, 328  
 Linear elastic fracture mechanics, biaxial stress bending, 161  
 Linear life fraction model, 1  
 Linear strain and life fraction rule, 328  
 Load transfer, titanium metal matrix composites, 24  
 Low-cycle fatigue  
     coiled tubing, 283  
     near- $\alpha$  titanium alloy, 188  
 Lugs, crack growth, spectrum loading, 248

**M**

Metal fatigue, prestraining effect, 328  
 Metal matrix composites, unidirectional, thermomechanical fatigue life, 1  
 Micromechanics, unidirectional metal matrix composites, 1  
 Microstructural interactions, crack development prediction, 202  
 Multiaxial fatigue, coiled tubing, 283

**N**

Newman's Dugdale strip-yield model, 116  
 Nickel-base superalloy, prestraining, 328  
 Nonlinear damage curve approach, 328  
 Notched components  
     fatigue behavior, 116  
     notch strain analysis, aircraft, 220  
     root closure, crack development prediction, 202  
     root fatigue, 136

**P**

Plasticity, cyclic, 283  
 Prestraining, effect on life, 328

**R**

Random loading process, 305  
 Residual fatigue life, 305  
 Resistance spot weld connections, life prediction, 265

**S**

Silicon carbide fibers, thermomechanical fatigue life, 1  
 Smith-Watson-Topper parameter, 328  
 Spectrum loading  
     lugs, crack growth, 248  
     notch root fatigue, 136  
 Strain life analysis, 220  
 Stress  
     mean, 305, 328  
     minimum, 67  
 Stress intensity factor, 248  
 Stress-strain curve, elastomer matrix composite, 67  
 Structural life analysis, B-2 bomber, 220

Structural stress, resistance spot weld connections, 265  
 Surface replica, 136

**T**

Thermomechanical fatigue  
     life, unidirectional metal matrix composites, 1  
     polymer matrix composites, 39  
 Thickness effect, notch root fatigue, 136

Titanium alloys, near- $\alpha$ , short crack behavior, 188  
 Titanium metal matrix composites  
     bridging fiber stress, 24  
     thermomechanical fatigue life, 1  
 Tubing, coiled, multiaxial plasticity and life prediction, 283  
 TWIST spectrum loading, 136

**V**

von Mises yield surfaces, 283