

# Subject Index

## A

Adherends, composite patch repair, 444  
 Adhesives, composite patch repair, 444  
 Aircraft  
   HALE, 264  
   horizontal tail, 253  
 Angle-ply laminates, commingled  
   polyetherketone/carbon composites,  
   400

## B

Bondlines, composite patch repair, 444  
 Boron/aluminum, macro—micromechanics  
   analysis, 222  
 Brittle-matrix composites, deformation and  
   failure, 204

## C

Carbon-epoxy composites, open hole and  
   postimpact compressive fatigue, 37  
 Carbon fiber composites, 293  
 Celion 3000/PMR-15, hot/wet testing, 131  
 Ceramic composites, 204  
 Co-cured process, 293  
 Coefficient of moisture expansion, IM7  
   graphite/PEEK, 118  
 Coefficient of thermal expansion, IM7  
   graphite/PEEK, 118  
 Composite materials  
   brittle-matrix, 204  
   carbon-epoxy composites, 37  
   carbon fiber, 293  
   CELION 3000/PMR-15, 131  
   co-cured sandwich panels, 293  
   commingled PEEK/carbon, 400  
   compressive deformation and failure, 87  
   with defects, 320  
   E-glass/epoxy laminates, 87  
   fiber waviness, 20  
   film adhesive interlayers, 384  
   glass-epoxy laminates with matrix cracks,  
   348

high strain rate compressive properties, 54  
 high-temperature fatigue behavior, 192  
 hot/wet testing, 131  
 IM7/PEEK, 118  
 integral, 238  
 notched, 222, 414  
 out-of-plane loads, 238  
 polyimide quartz laminate, 279  
 sandwich shell horizontal tail, 253  
 SiC(SCS-6)/Ti-15-3, 70, 175  
 SiC/Ti-24Al-11Nb, 192  
 strain distribution and tab orientation,  
   103  
 strength prediction, 142  
 stress field sensitivity, 444  
 stub-blade wing joint, 264  
 tab orientation effect, 103  
 test methods, 7  
 thermographic stress analysis, 428  
 thermomechanical testing, 70  
 thermosetting, 308  
 ultrasonic nondestructive evaluation, 330  
 unidirectional curved laminates, 365  
 Composite repair, stress field sensitivity, 444  
 Compression testing, 7  
 Compressive behavior  
   composite materials, 54  
   E-glass/epoxy laminates, 87  
   fiber composites, 20  
   notched composite laminates, 414  
 Compressive failure, 7  
   E-glass/epoxy laminates, 87  
 Compressive fatigue, stitched and unstitched  
   composites, 37  
 Creep, SCS-6/Ti-15-3, 175  
 Cure monitoring, 308  
 Cyclic fatigue, metal-matrix composites, 70

## D

Damage  
   accumulation, notched composite  
     laminates, 414  
   evaluation, composite materials, 428  
   suppression, film adhesive interlayers, 384

Damage—*continued*  
 tolerance, commingled PEEK/carbon composites, 400  
 Defects, composite materials with, 320  
 Deformation  
   brittle-matrix composites, 204  
   E-glass/epoxy laminates, 87  
 Delamination  
   glass-epoxy laminates with matrix cracks, 348  
   out-of-plane loads, 238  
   suppression, film adhesive interlayers, 384  
   unidirectional curved composite laminates, 365  
 Discrete fiber-matrix model, 222  
 Dry ply, composites, 320

**E**

Edge delamination test, 7  
 E-glass/epoxy laminates, compressive deformation and failure, 87  
 End tab design, composite materials, 103

**F**

Failure  
   brittle-matrix composites, 204  
   composite materials, 142  
 Failure modes  
   analysis, 7  
   commingled polyetherketone/carbon composites, 400  
   metal-matrix composites, 70  
 Fatigue  
   composite materials, 428  
   SCS-6/Ti-15-3, 175  
   SiC/Ti-24Al-11Nb, 192  
 Fiber composites, strength prediction, 142  
 Fiberglass, strain distribution and tab orientation, 103  
 Fiber-matrix debonding, 204  
 Fiber-reinforced composites, 54  
   thermographic stress analysis, 428  
 Fiber waviness, composite materials, 20  
 Film adhesive interlayers, delamination suppression, 384  
 Finite element analysis, composite materials, 103  
   with defects, 320  
   patch repair, stress field sensitivity, 444  
   sandwich shell horizontal tail, 253  
   three-dimensional, glass-epoxy laminates with matrix cracks, 348  
   unidirectional curved composite laminates, 365

Forward sweep, 253  
 Fractography, metal-matrix composites, 70  
 Fracture  
   film adhesive interlayers, 384  
   notched composite laminates, 414  
   toughness, curved composite laminates, 365  
 Free-edge stress analysis, glass-epoxy laminates with matrix cracks, 348

**G**

Glass-epoxy laminates  
   compressive deformation and failure, 87  
   with matrix cracks, free-edge stress analysis, 348  
 Graphite/epoxy laminates  
   film adhesive interlayers, 384  
   out-of-plane loads, 238  
 Graphite fiber composites, spacecraft structural applications, 118  
 Graphite/polyimide composites, hot/wet testing, 131

**H**

HALE aircraft, 264  
 Heating effects, metal-matrix composites, 70  
 High strain rate, composites, 54  
 High-temperature composites, thermomechanical testing, 70  
 Honeycomb core construction, 293

**I-J**

Image enhancement, ultrasonic nondestructive evaluation, 330  
 IM7 graphite/PEEK, spacecraft structural applications, 118  
 Impact, low-velocity, 37  
 Interface, notched metal-matrix composite, 222  
 Interlaminar fracture, glass-epoxy laminates with matrix cracks, 348  
 Interlaminar stress, 238  
   film adhesive interlayers, 384  
 Joints, composite patch repair, stress field sensitivity, 444

**L**

Laminates  
   composite patch repair, stress field sensitivity, 444  
   curved, delamination, 365  
   E-glass/epoxy, 87

glass-epoxy, with matrix cracks, 348  
 graphite/epoxy, 238, 384  
 notched, 414  
 PEEK/carbon, 400  
 strength prediction, 142  
 thick, 279  
 Load cycling, polyimide quartz, 279

## M

Macro-micromechanics analysis, notched  
 metal matrix composite, 222  
 Matrix ply cracking, 348  
 Mechanical properties  
 Celion 3000/PMR-15, 131  
 IM7 graphite/PEEK, 118  
 Metal-matrix composites  
 notched, macro-micromechanics  
 analysis, 222  
 thermomechanical fatigue behavior, 70  
 unnotched, 175  
 Micromechanics, 20  
 Minimum strength model, 414  
 Moisture content, Celion 3000/PMR-15,  
 131  
 Multiaxial testing, E-glass/epoxy laminates,  
 87

## N

NASTRAN model, 253  
 Nondestructive evaluation  
 composites with defects, 320  
 ultrasonic, 330  
 Notched composite laminates, damage  
 accumulation and fracture, 414  
 Notched metal-matrix composite, macro-  
 micromechanics analysis, 222

## O

Open hole compressive and tensile strengths  
 carbon-epoxy composites, 37  
 commingled polyetherketone/carbon  
 composites, 400  
 Out-of-plane analysis, composite materials,  
 238

## P-Q

Patch repair, composites, stress field  
 sensitivity, 444  
 Ply drop off, 238  
 Polyetherketone/carbon composites,  
 commingled, damage tolerance,  
 400

Polyimide quartz laminate, temperature and  
 load cycling, 279  
 Postimpact fatigue, 37  
 Process control, automated, thermosetting  
 composites, 308  
 Properties, loss of, 279  
 Quadratic Delamination Criterion, 384  
 Quality evaluation, co-cured sandwich  
 panels, 293

## S

Sandwich panels, co-cured, 293  
 Sandwich skin, 253  
 Scarf lap joints, composite patch repair,  
 444  
 SCS-6/Ti-15-3, unnotched, 175  
 Shear behavior, nonlinear, 20  
 Shear lag analysis, brittle-matrix composites,  
 204  
 Shell structure, 253  
 Short beam shear, 7  
 SiC(SCS-6)/Ti-15-3  
 thermomechanical fatigue behavior, 70  
 unnotched composites, 175  
 SiC/Ti-24Al-11Nb, high-temperature  
 fatigue behavior, 192  
 Silicon-carbide fibers, 175  
 Single lap joints, composite patch repair,  
 444  
 SPATE, composite materials, 428  
 Static tests, composite patch repair, 444  
 Stepped lap joints, composite patch repair,  
 444  
 Stitched composites, compressive fatigue,  
 37  
 Strain energy release rate, curved composite  
 laminates, 365  
 Strain gages, Celion 3000/PMR-15, 131  
 Strength prediction, composite materials,  
 142  
 Stress  
 contours, notched metal-matrix  
 composite, 222  
 out-of-plane loads, 238  
 Stub-blade wing joint, 264

## T

Tape composites, compressive fatigue, 37  
 Temperature cycling, polyimide quartz,  
 279  
 Tensile strength  
 composite materials, 103  
 notched composite laminates, 414  
 Test methods, composite materials, 7

Textile composites, compressive fatigue, 37  
Thermoelasticity, 428  
Thermographic stress analysis, damage in composites, 428  
Thermoplastics, commingled PEEK/carbon composites, 400  
Thermosetting composites, automated process control, 308  
Three-dimensional braid, commingled PEEK/carbon composites, 400

Titanium aluminate, high-temperature fatigue behavior, 192  
Translaminar stress, 238

**U-W**

Ultrasonic nondestructive evaluation, 330  
Water absorption, IM7 graphite/PEEK, 118  
Wing joints, 264  
Wrinkle, composites, 320