Subject Index

A
Aircraft component defects, using quantitative fractography, 52, 61
Airframes, 144
Aluminum alloys, 52, 144
Aluminum, 2024, composition, 27 (table)
ASTM test method E 813-86: 74, 76

B
Brittle fracture in weldments, 102
Brittle systems, 4

C
Chemical composition of pressure vessel steels, 90 (table)
Cleavage fracture
  in nuclear pressure vessel steels, 89
  in weldments, 102
Computed tomography, 3
Corrosion fatigue, 144
Crack formation and growth, 123
Crack growth
  aircraft components, 53–54, 58
  hydrogen-assisted cracking, 69
  in aluminum alloys, 146–153
  mean stress/strain, 123
Cracking, hydrogen-assisted, 69
Crack orientation, 123, 144
Crack propagation, 3
Crack tip blocking, 144
Critical strain energy density, 26

D
Damage detection, 3
Damage, shear type, 123
Defects, 52
Deformation, 3
Diffusion of hydrogen
Durability of aluminum alloys, 144

E
Experimental techniques, fractography, 4

F
Failure analysis, 3, 26, 52–54
Fatigue
  crack propagation, 52, 144
  multiaxial, 123
  striations, 52
  thresholds, 144
Fractals, 39
Fractography
  analysis of aircraft defects, 52
  application to materials processes, 3
  brittle fracture in weldments, 102
  corrosion fatigue, 144
  hydrogen-assisted cracking, 69
  nuclear pressure vessel steels, 89
  quantitative analysis using fractals, 39
  relationship to material toughness, 26
  weld metals, 89
Fracture
  analysis, 52
  mechanics, 52, 102, 144
  surfaces, 3–5, 39
  toughness, 69, 89
  transition, 89

H
Heat-affected zone, 102
Holding load and fractographic (HLF) test method, 72–74
Hydrogen-assisted cracking measurement, test methods, 69–72
Hydrogen embrittlement, 144
HY–100 steel composition, 26 (table)

Material toughness, 26
Mean stress, 123
Mechanical properties of materials, 39, 42 (table)
Micromechanical behavior, 26
Microstructures
brittle fracture in weldments, 102
effects on fracture behavior, 39
Military aircraft fracture analysis, 53
Mode of fracture, 69
Monotonic loading, 26
Multiaxial fatigue loadings, 123

Nuclear reactor vessels, 89

Optical microscopy, 57, 102

Pressure vessel steel, chemical composition, 89, 90 (table)

Quantitative fractography, 4–5, 39, 52
Quasi-cleavage, 69

Roughness, 3, 39

Scanning electron microscope, 52–53, 57, 102
Shear type damage, 123
Silicate particles in weld metals, 97 (table)
Steel
brittle fracture in weldments, 102
mechanical properties, 127 (table)
Steel, HT–100, composition, 27 (table)
Stereology, 3
Strain energy density, 26
Stress/strain, 123
Surface roughness, 4

Threshold stress intensity, 69
Tomography, 3
Toughness, 26, 102
Transmission electron microscope, 52

Weldments
brittle fracture, 102
Weld metals
brittle fracture, 102
fractographic study in nuclear pressure vessels, 89
silicate particles, 97 (table)