Subject Index

A

ASTM standards
A 515, 100
A 533B, 100, 286, 425
E 399, 445, 519

proposed practice, fracture toughness in transition, 286

B

Bending loads, 21
Bend specimens, 445
small, 519
Bi-axial loading, 316, 501
Bi-axial stress effect, 3
Brittle-ductile transition, 3, 191
Brittle fracture, 519
Burst test, 392

C

Cavity growth modeling, 363
Center cracked specimens, 392
Circumferentially notched round bar specimens, 344
Cleavage fracture, 3, 134, 163, 191, 445

toughness, 100, 519
Compact tension specimens, 71, 88
Constraint elevation, 134
Constraint factor, 21, 134, 209, 255
out-of-plane, 71
Constraint Gurson model, 163
Constraint model, 461
Cracked round bars, 255
Cracked welds, 363
Crack growth, 134, 191
resistance, 163
resistance curve, 71, 209, 232, 392
stable, 71, 100

D

Deformation, 255
limits, 445
Deformation theory plasticity, 43

Double-edge cracked tension geometries, 461
Double-edge notch specimen, 316
Ductile/brittle fracture, 134
Ductile crack extension, 100
Ductile failure, micromechanisms of, 209
Ductile fracture, 71, 134, 163, 191, 425
Ductile tearing, 100, 134, 363
resistance, 232
Ductile-to-brittle transition region, 100, 134, 286
Ductile to cleavage fracture mode, 255

E

Elastic-plastic analyses
plane strain, 43
finite element analyses, 21, 344, 425
fracture, 3, 425
Elevation, constraint, 134

F

Ferritic materials, 100
Ferritic steel, 191, 255, 286
542 CONSTRAINT EFFECTS IN FRACTURE

Finite element analysis, 43, 71, 88, 232
  elastic-plastic, 344, 425
  round bars, 255
  three-dimensional, 316
Finite elements, 21, 100, 134, 163, 191
Flaw, semi-elliptical surface, 88
Four-point-bend specimens, 191
Fracture resistance, 163
Fracture toughness, 425, 461, 479, 501
ASTM E 399, 445, 519
  cleavage, 100
ductile/brittle, 134
  in transition range, proposed
  ASTM standard, 286
  measurements, 255

G

Geometry
  effects, 344, 461
  shallow-flaw, 501
  variation effects, 71
  Zr-2.5Nb, 392
GURSON model, 232
  constraint gurson, 163, 191

H

Hydrostatic field, 479

J

J-A$_2$ methodology, 3
J-concept, modified, 88
J-integral, 3, 286, 425, 445
J-Q approach, 316, 363, 461, 479, 501
J-R curve, 209, 392
  $J-R$ curve, 71, 232
J-T characterization, 43, 363

K

$K_{IC}$, 445

L

Loads and loading, 43, 363
  bending, 21
  biaxial, 316, 501
dynamic, 232
  effects, 344
  static, 232
tension, 21
  unloading, 479

M

Micromechanical model, 209
Middle tension specimens, 88
Models and modeling
  cavity growth, 363
  constraint, 461
  constraint gurson, 163, 191
  GURSON, 232
  micromechanical, 209
  numerical, 100
  numerical, stable crack growth, 88
  scaling, 286
  statistical, 461
  three-dimensional, 21
two-dimensional, 21
Molecular weight, 344

N

Numerical model, 100
  stable crack growth, 88

P

Plane strain conditions, 71, 134
Plane strain elastic-plastic analyses, 43
Plane strain fracture, 445, 519
toughness, 255
Plastic deformation, 134
Plasticity, 21, 344
deformation theory, 43
  $J_2$ flow theory, 163
Poly(methyl methacrylate), 344
Pressure tube material, 392
Pressurized thermal shock, 479
Q
Q stress, 209

R
R-curves, 425

S
Scaling models, 286
Scatter, 100
Short crack bend specimens, 286
Side-grooved specimens, 88
Single-edge notch specimens, 344
Size effect, 344, 461, 519
Small-scale yielding, 445
Stable crack growth, 71, 100
Standards
ASTM A515, 100
ASTM A533B, 100, 286, 425
ASTM E 399, 445, 519
ASTM proposed, fracture toughness, 286
BS4360, 425
Statistical model, 461
Steel, 100, 191, 255, 286, 316, 425, 461
Stress, out of plane, 316
Stress strain curves, 425
Stress triaxiality, 100, 134, 363
Surface tension, part-through, specimens, 88

T
Tension loads, 21
Tension specimens, 286
Thermal shock, 501
pressurized, 479
Three-dimensional model, 21, 88
Titanium, 255
Transition fracture toughness, 461
Triaxiality, 88, 209
stress, 100, 134
Tridimensional analysis, 71
TSE-5A, 501
Two-dimensional model, 21
Two-parameter characterization, 43, 134, 316, 363
T-stress, 43

V
Validity, 519
Void coalescence, 163
Void growth, 163
Void nucleation, 191

W
Weibull analysis, 286
Weibull model, 461
Welds, cracked, 363
Work hardening, 425

Y
Yielding, 100
small scale, 445
Yield strength, 425

W
Warm prestress, 479

Z
Zr-2.5Nb, 392