

Index

A

Activation energy, 64
 Aging, 77, 157, 166, 184, 308, 321, 355
 Aluminum, 211, 331, 465
 Anneal, 173, 443
 Auger spectroscopy, 141, 150, 441
 Austenitic alloys, 6, 33, 35, 37, 72, 92, 101, 120

B

Blue brittle, 54
 Burst test, 103

C

Carbides, 82, 119, 228, 274
 Carbon, 55, 67, 150, 197, 211, 301, 420
 Cavities, 111
 Channel fracture, 130, 133
 Charpy-V notch test, 392, 397, 403, 435, 440
 Chromium, 151, 270, 420, 465
 Cladding, 6, 101, 107, 209, 220
 Clusters, 242, 286, 375, 452
 Cold working, 6, 35, 72, 84
 Columbium, 211, 242, 465
 Columbium alloys, 243
 Compact tension, 389
 Composition, effect of, 196, 199, 211
 Control rod thimble, 120
 Copper, 211, 415, 426, 465

Cottrell atmosphere, 260
 Cracks, 389
 Creep, 12, 23, 294
 Coefficients, 25, 35
 In-reactor, 10
 Irradiation, 10, 37, 285
 Model, 12
 Transient, 28

D

Damage energy cross section, 471, 480
 Damage function, 187, 189, 470
 Decarburized steel, 67
 Defects, 451
 Delta phase, 362, 365
 Density, 73, 220, 273
 Diffraction patterns, 359
 Diffusion, 380
 Dislocations, 82, 133, 143, 234, 245, 257, 285, 300, 302, 340, 375
 Climb-glide mechanism, 291
 Displacement spikes, 449
 DPA models, 230
 Kinchin and Pease, 230, 317, 339
 Ductility, 94, 108, 129, 132, 160, 179

E

Electron diffraction, 359
 Electron vacancy, 270, 278
 Elongation
 Uniform, 165, 179, 182
 Total, 179, 182, 185

Eta phase, 367

F

Failure

Strain, 104

Stress, 104

Temperature, 104

Fast Flux

 $E > 0.1$ MeV, 7, 20, 35, 55, 73, 93,
101, 120, 140

Ferritic alloys

EM-12, 228

HT-19, 228

Fluence effect, 127, 412

Foil, 73, 229, 243

Fracture

Intergranular, 130

Mode, 111, 128

Strength, 1

Toughness, 111, 388, 404

Transgranular, 130

Transition, 136

Fuel cladding transient tester, 102

Fuel column, 115

Fuel pin, 101, 130, 172, 220

G

Gamma heated, 271

Gamma prime, 143, 271, 315, 321,
355, 382

Grain boundaries, 156, 234

H

Hardening

Precipitation, 143, 370

Work, 59, 80

Hastelloy-X, 280

HAZ, 401

Heating rates, 109

Helium, 75, 95, 132, 154, 174, 190,
224, 317, 338**I**Impact testing, 389, 392, 397, 403,
435, 440

Impurities, 244, 259, 267

Incoloy 800, 280

Inconel 706, 354

Inconel 718, 156, 354

Interstitials, 244, 266, 292, 298, 449

Iron, 270, 450, 465

Iron-nickel chromium alloys, 315,
337

Irradiation

Alpha particle, 285

Deuteron, 285

Electron, 213, 243

Ion, 195, 229, 279, 300, 317, 338,
354, 371Neutron, 20, 35, 55, 73, 93, 101,
120, 140, 157, 176, 238, 391Temperature, 20, 35, 73, 92, 103,
120, 140, 156, 182, 295, 300**K** K_{ic} , 390

Knoop hardness, 176, 178

L

Laves phase, 367

Luders band, 59, 64

Luders strain, 56, 64

M $M_{23}C_6$, 82

Manganese, 420

McVetty relationship, 38

Mechanical properties, 12, 23, 75,
92, 95, 101, 120, 146, 160,
171, 185, 402

Metallography, 175

Microhardness, 174, 438

- Microscopy
 Optical, 441
 SEM, 111, 129, 141, 149, 441
 TEM, 78, 141, 231, 286, 317, 343, 354, 372, 441
 Microstructure, 82, 141, 179, 233, 284, 288, 298, 340, 357
 Mild steels, 55
 Molybdenum, 420
 Mu phase, 367
- N**
- Nickel, 151, 285, 420, 465
 Nickel alloys
 PE16, 33, 140, 271, 354
 GAB, 286, 271
 Nickel-aluminum alloys, 372
 Ni₃Al, 378
 Nimonic alloys, 33, 140, 271, 354
 Nitrogen, 150, 197, 203
- O**
- Overaging, 362
 Oxygen, 246, 301
- P**
- Pauling's model, 278
 Percipitates, 82, 143, 300, 305, 317, 321, 365, 373
 Phosphorus, 151, 203, 415
 Point beach nuclear, 172
 Point defects, 258, 266, 349
 Polygonization, 84
 Pressure vessel, 389, 401
- R**
- Reactors
 CRBRP, 182, 195
 CTR, 189
 DFR, 35, 271
 DMTR, 35
 EBR-II, 20, 35, 73, 92, 103, 120, 140, 156, 182, 209, 225, 238, 464
 ENEL, 387
 FFTF, 91, 103, 195
 FTR, 182, 209, 225
 HFIAR, 55
 HFIR, 182, 224
 LAMPF, 188
 LMFBR, 72, 91, 101, 156, 353, 463
 Maine Yankee, 400
 UCRR, 391
 Recovery, 438, 441
- S**
- Serrations, 59
 Sigma phase, 276
 Silicon, 211, 420
 Simulation, of neutron irradiation, 195, 213, 229, 243
 Stainless steels
 316 SS, N-lot, 92, 209, 217, 271
 M316, 33, 37, 271
 316L SS, 271
 316 SS, 6, 35, 72, 92, 101, 195, 209
 321 SS, 271
 FV548, 33, 37, 271
 G 68, 271
 Strain
 Rate effects, 98, 126
 Ratio, 105
 Stress
 Maximum fiber, 10
 Relaxation, 8, 33
 Structural steels
 A302-B, 388, 422, 435
 A508-2, 422
 A533-B, 413, 422
 A533-C-2, 422
 A543, 422
 HY80, 422

NiCrMo, 422
 MnNiMoV, 423
 Sulfur, 151, 203
 Surveillance materials, 401
 Swaged, 140, 271, 316
 Swelling, 88, 142, 195, 200, 209,
 231, 271, 273, 315, 317, 325,
 345
 Model, 210

T

Tantalum, 465
 Tensile, 75, 92, 120, 156, 176, 401
 Thermal transients, 104, 108
 Thompson effect, 260
 Titanium effects, 197, 211, 331
 Transition temperature increase,
 DTT, 411, 419, 426
 Tubing, 92, 271
 Slit, 13
 Tungsten, 465

U

Ultimate strength, 75, 95, 124, 125,
 178, 182

Upper-shelf energy, 392, 411

V

Vacancies, 253, 257, 292, 449
 Vanadium, 298
 Vanadium alloys, 298
 Voids, 73, 82, 111, 142, 220, 231,
 256, 270, 300, 302, 322, 340,
 347, 375

W

Welds, 157, 401, 416, 419, 436
 Wisconsin Electric Company, 172
 Wrought, 159

Y

Yield strength, 75, 95, 124, 164, 178,
 182, 391

Z

Zircaloy, 171