

## Subject Index

### A

Accelerated testing, 131  
 Acidic solutions, effect on  
   stainless steels, 352  
 Adsorption, chloride ion, 352  
 Aging, 224  
   material, 3  
 Aircraft, 3  
 Alloy 825, 273  
 Aluminum, 3, 191, 382  
 Annealing, solution, 224  
 Anodic dissolution, 444  
 Anodic polarization, 429  
 Anodic processes, 363  
 API 5L grade X56 line pipe  
   steel, 303  
 ASTM Committee G01 on  
   Corrosion of Metals, 317  
 ASTM standards, 317  
   A 193, 224  
 Atomic force microscopy, 394  
 Axial cracking, 473

### B

Baffle/former bolts, 210, 224  
 Blunting effect, 444  
 Boiling water reactors, 166, 210  
 Bolt cracking, 210  
 Bond percolation, 40  
 Brass castings, 458

### C

Cantilever beam, double, 303  
 Cathodic hydrogen  
   embrittlement, 363  
 Cathodic processes, 363  
 Cathodic protection, 241  
 Cathodic reactions, 411  
 Caustic cracking, 363  
 Chemical process industry, 289  
 Chloride cracking, 289  
   stress corrosion, 273, 363, 429  
 Chloride ion adsorption, 352

Chloride solution, 104, 273  
 Chromium  
   iron-nickel-chromium-  
     molybdenum  
       alloys, 273  
 Circumferential cracking, 473  
 Coating, disbonded, 241  
 Cobalt alloys, 289  
 Component design, 259  
 Component performance, 259  
 Compressive residual stress, 473  
 Coolant circuits, power plant, 166  
 Copper, 343  
   valves and fittings, 458  
 Copper Development  
   Association, 458  
 Crack growth kinetics, 23  
 Creep, 191  
   low temperature, 473  
 Crevice corrosion, 166  
 Crystallographic grain  
   misorientation, 40  
 Cyclic loading, 429  
 Cyclic pre-loading, 329  
 Cyclic pre-straining, 343  
 Cyclic strain cracking, 429

### D

Damage accumulation, 166  
 Damage delay, 343  
 Deformation  
   near-tip, 329  
   plastic, 394  
 Design approach, 259  
   corrosion based, 131  
 Diffusion, stress-assisted, 329  
 Dislocation structure, 343  
 Displacement  
   rising load/rising displacement  
     testing, 317  
 Double cantilever beam, 303  
 Ductile fracture, 104

### E

Electrochemical conditions, 444

Electrochemical film-rupture model, 411  
 Electrochemical noise analysis, 343  
 Embrittlement, hydrogen, 23, 40, 70, 104, 303, 363  
 Environmental definition, 131  
 Erosion-corrosion, 166  
 European Structural Integrity Society, 317  
 Eutectoid steel, 444  
 Evolution prediction, crack, 23

## F

Failure definition, 131  
 Fatigue  
   corrosion, 166, 363  
   crack growth, 3, 191, 382  
   cracking, corrosion, 429  
   dislocation structure, 343  
 Field performance, 259  
 Film rupture, 411  
 Fluid cell, atomic force microscopy, 394  
 Fracture evolution, 444  
 Fracture mechanics  
   linear elastic, 317  
   testing, 273  
 Fracture toughness, 303

## G

Gas industry, 303  
 Gas lines, 241, 473  
 Gate valves, 458  
 Grain boundary, 394  
 Ground movement, 473

## H

Hydrocarbon reformer, steam, 429  
 Hydrochloric acid, 352  
 Hydrofluoric acid cracking, wet, 289  
 Hydrogen, 473  
 Hydrogen assisted cracking, 329  
 Hydrogen diffusion, 329  
 Hydrogen embrittlement, 23, 40, 70, 104, 303, 363  
 Hydrogen environments, 303

Hydrogen plant, 429  
 Hydrogen transport, 70  
 Hydrogen trapping, 40, 70  
 Hydrostatic test, 473

## I

IASCC susceptibility, 191  
 Initiation strain, crack, 343  
 Inspection, risk-based, 23  
 Intergranular cracking, 40, 224, 241, 458  
 International Organization for Standardization  
   ISO TC 156, 317  
 Iron alloys, 289  
   iron-nickel-chromium-molybdenum alloys, 273  
 Irradiation assisted stress corrosion cracking, 191, 210, 224

## J

Japan Atomic Energy Research Institute  
   Material Performance Database, 191  
 JPMD, 191

## L

Life cycle management, 3  
 Life prediction, 3  
 Light water reactors, 191, 224  
 Load/displacement testing, 317  
 Loading  
   cyclic, 429  
   monotonic, 329  
   pre-loading, cyclic, 329  
   rate, 104  
   rate, effects, 303  
 Locations for analysis matrix, 131

## M

Manganese bronze castings, high strength, 458  
 Magnesium chloride, 343  
 Material definition, 131

Material performance, 273  
 Material Performance Database,  
 JAERI, 191  
 Materials Technology Institute  
 of the Chemical Process  
 Industries, 289  
 Mechanistically based probability  
 model, 3  
 Micromechanical model, 70  
 Microscopy, 444  
     atomic force, 394  
     scanning electron, 411  
 Microstructure, pearlitic, 444  
 Mode definition, 131  
 Modeling, 259  
     crack growth kinetics, 23  
     electrochemical, 411  
     intergranular cracking, 40  
     mechanistically based  
         probability, 3  
     micromechanical, 70  
     numerical, 303  
     quantitative, hydrogen  
         diffusion, 329  
     reactive-transport, 241  
     thermodynamic, 241  
 Molybdenum  
     iron-nickel-chromium-  
         molybdenum  
         alloys, 273  
 Mossbauer analysis, 411

## N

Near threshold fatigue crack  
     growth, 382  
 New York City water supply  
     system, 458  
 Neutron fluence, 191  
 Nickel, 224  
     alloys, 289, 429  
     iron-nickel-chromium-  
         molybdenum  
         alloys, 273  
 Nitrite, 343  
 Noise analysis, electrochemical,  
     343  
 Nomenclature, environmentally  
     induced cracking,  
     aqueous systems, 363  
 Nuclear reactors, 166, 191, 210,  
     224

Nucleation, crack, 394  
 Numerical model, pipeline  
     steel fracture toughness, 303

## O

Oil pipeline, 473  
 Oxygen, dissolved, 191

## P

Path connectivity, crack, 40  
 Phosphate environment, 411  
 Pipeline  
     API 5L grade X56 line pipe  
         steel, 303  
     gas transmission, 241  
     stress corrosion cracking, 473  
 Pitting, 3, 23, 166, 273  
 Plasticity, 40, 70  
     corrosion/plasticity  
         interactions, 343  
 Power plant coolant circuits, 166  
 Pre-cracked specimens, 329  
 Pressure fluctuation, 473  
 Pressure regulated valves, 458  
 Pressurized water reactors, 210,  
     224  
 Propagation rates, crack, 411

## Q

Quantitative model, hydrogen  
     diffusion, 329

## R

Radiation-induced segregation,  
     224  
 Radioactive waste containers,  
     high level, 273  
 Raman spectroscopy, surface  
     enhanced, 352  
 Reactive-transport model, 241  
 Reactors, 166, 191, 210, 224  
 Reliability assessment, 3  
 Repassivation, 273  
 Rising load/rising displacement  
     tests, 317

## S

Scanning electron microscopy, 411, 458  
 Segregation, radiation-induced, 224  
 Silicon, 224  
 Silver, 429  
 Sodium chloride solution, 382  
 Sodium thiosulfate, 394  
 Solute depletion, 40  
 Solute segregation, 40  
 Solution annealing, 224  
 Specimen bending device, 394  
 Standards (See also ASTM standards), 259, 317  
 Statistical definition, 131  
 Steam and hydrocarbon reformer condensates, 429  
 Steels, 273  
   A 193, 224  
   austenitic, 191, 210, 352  
   chromium, 224  
   eutectoid, 444  
   high strength, 329  
   linepipe, 303, 473  
   low alloy, 166, 191  
   mild, 411  
   stainless, 166, 289  
     Type 304, 352, 394  
     Type 304L, 429  
     Type 316L, 210, 224, 273, 352  
 Strain rate, crack tip, 104  
 Strain rate testing, slow, 191, 273, 317  
   high strength steel, 329  
   mild steel, 411  
   stainless steel, 224, 429  
   tensile, 343  
 Stress-assisted diffusion, 329  
 Stress, compressive residual, 473  
 Stress corrosion cracking, 166, 259, 289, 429  
   chloride, 273, 363  
   eutectoid steel, 444  
   gas transmission lines, 241  
   intergranular, 241, 394, 458  
   irradiation assisted, 191, 210, 224  
   mechanical aspects, 70  
   mild steel, 411

nomenclature, 363  
 nucleation sites, 394  
 pipeline steels, 473  
 prediction, 131  
 rising load/rising displacement, 317  
 stainless steel, 343, 352  
 titanium alloys, 104  
 transgranular, 241, 458  
 valves and fittings, 458  
 waste container materials, 273  
 Stress distributions, residual, 329  
 Stress intensity, 382  
   factors, 104  
   factors, threshold, 317  
 Stress, local, 473  
 Stress, nominal, 473  
 Stress ratio, 382  
 Stress strain field, 329  
 Surface films, 352  
 Sweep techniques, 411

## T

Taxonomy, environmentally induced cracking, 363  
 Tensile data, 191  
 Tensile stress, 40  
   stainless steels, 352  
 Thermodynamic model, 241  
 Threshold fatigue crack growth, near, 382  
 Threshold stress intensity factor, 317  
 Titanium alloy, 104  
 Transgranular stress corrosion cracking, 241, 458  
 Trapping, hydrogen, 40, 70  
 Turbine disks, steam, 166

## U

U-bend specimens, 289  
 Ultrasonic nondestructive examination, 210

## V

Vacuum, 382  
 Valves and fittings, water, 458

**W**

Waste containers, high level  
radioactive, 273  
Water supply system, valves and  
fittings, 458

Water, trapped, 241  
Wedge-loaded specimens, 289

**X**

X-ray diffraction, 411