

Index

a

Abnormal glow discharge 43
 Absolute permittivity 3
 AC (alternate current) 46
 Activated carbon 8, 9, 10, 25, 26, 29,
 83, 110
 Activation 1, 9, 21, 23, 109, 110, 111
 Adsorption 21, 110
 AI (Artificial intelligence) 137, 143,
 144
 Air curtain 21
 Air-pollution filters 21
 ANN (artificial neural networks)
 143, 144
 Anode 34, 122, 134, 135
 Arc(s) 34, 35, 37, 39, 42, 43, 46, 59,
 60, 68, 115, 133, 134, 137, 142
 Arc root 134
 Argon 60
 Ash 2, 8, 17
 Asymptotically stable 140
 Atmospheric pressure 39, 40, 42, 43,
 45, 117, 119, 120, 140, 141
 Attractor 137, 138

b

Bifurcations 136
 Big data 143

Biochar 1, 4, 7, 8, 9, 17, 21, 23, 24,
 25, 33, 68, 70, 79, 83, 109, 128
 Biomass 3, 4, 8, 17, 18, 21, 23, 33, 34,
 39, 52, 53, 59, 60, 63, 66, 67, 68,
 70, 72, 83, 110, 119, 128, 133,
 137, 144
 Bio-oils 15, 17
 Burn off 25, 111
 Butane activity 8

c

Carbon recovery 8
 Cathode 33, 34, 122
 Cathode fall 120, 122, 124, 134
 Cation exchange capacity 7
 Cellulose 14, 52, 67, 72
 Chaotic behavior 136, 137, 138
 Charring 15
 Chemical activation 22, 27, 29
 Clean-up process 69
 Closed loop 137
 Coaxial flow stabilized arc 133
 Collision cross section 117, 131
 Collision frequencies 60
 Contact glow discharge electrolysis
 49
 Continuum 118, 119
 Control 15, 20, 133, 137, 138, 140,
 141

Corona discharge 40
 Cracking 15
 Current density 39, 42, 50, 80, 81,
 83, 85, 89, 93, 96, 117, 120, 121,
 122, 135

d

Dark discharge 40
 DBD (Dielectric barrier discharge)
 43, 44, 70, 71, 72, 141
 DC (direct current) 33, 40, 42, 47,
 50, 59, 60, 68, 115
 Density 1
 Depolymerization 15
 Dielectric 2, 43, 44, 52, 70, 81
 Dielectric breakdown 67
 Diffusion coefficient(s) 121
 Dimensionless variables 36, 121
 Discharges in liquids 49
 Distribution function 119
 Downdraft gasifier 16
 Drift current density 86
 Drift-diffusion model 83, 108
 Drift velocity 121, 124
 Drying 15
 Dynamic(s) 81, 115, 134, 144, 145

e

EHD (Electrohydrodynamics) 41, 50
 Electrical breakdown 68
 Electrical conductivity 3, 4, 6, 7, 9,
 36, 67, 79, 81, 83, 86, 102, 135
 Electric field 33, 36, 39, 40, 80, 81,
 83, 86, 89, 93, 94, 99, 116, 117,
 122, 135
 Electric-thermal model 79
 Electrolyte 50
 Electron avalanche 40
 Electron density 41, 44
 Electron temperature 39, 41

Elenbaas-Heller equation 35, 115,
 133
 Endothermic reactions 15
 Energy analyzer 142
 Energy consumption 26
 Equivalence ratio 19
 Excitation 33, 40
 Exothermic reactions 15

f

Fast Fourier transform 117
 Fast pyrolysis 14, 17
 Feedback control 137, 141, 142, 143
 Finite difference(s) 89, 93, 116, 117
 Fixed carbon 2, 9
 Flash pyrolysis 15
 Fluid approach 116, 118
 Fluidized bed 17
 Fractional order 137, 138
 Fragmentation 15
 Fuel-air ratio 19

g

Gasification 1, 14, 16, 17, 23, 63, 64,
 65, 67, 69, 70, 71, 72, 75, 79,
 128, 141
 Gliding arc 45, 52, 53
 Glow discharge(s) 42, 60, 63, 120
 Graphite 9, 10

h

Heat conduction potential 36
 Heat flux potential 36, 37
 Heat transfer coefficient 81, 85
 Helium 60
 Hemicellulose 14, 67
 Hydrodynamic model(s) 79, 103,
 104, 106, 107
 Hydrogen 53, 59, 60, 63, 72
 Hydrophobic 14
 Hydrothermal 17

i

Ideal gas law 117
 Impedance matching 47, 111
 Implicit time advancement 125
 Induction coils 35
 Instabilities 42, 133
 Integration method 116
 Internal model control 143, 145
 Iodine number 8
 Ionization 33, 41, 135
 Ionization coefficient 40, 121, 122
 Ion temperature 39

j

Jacobian matrix 139
 Jet 134
 Joule heating 35, 50, 67, 68, 79, 80,
 82, 83, 84, 95, 97, 102,
 104, 125

k

Kinetic approach 116
 Kinetic temperature 33
 Knudsen number 118, 119

l

Langmuir probe 142
 Lattice temperature 80, 81, 82, 83,
 84, 85, 89, 99, 102, 105
 Levenberg-Marquardt 144
 Life cycle analysis 59
 Lignin 14, 52
 Linearized radiation coefficient 81,
 85
 Loss tangent 2, 3
 Low power 39
 LTE (local thermodynamic
 equilibrium) 33, 35, 60, 63,
 115
 Luminous combustion 21

m

Magnetically stabilized rotating arc
 134
 Mass spectrometer 142
 Maxwell-Boltzmann distribution
 118
 Mean electron energy 122, 125, 126s
 Mean free path 117
 Mean velocity 125, 126
 Microwave discharge 46
 Microwave interferometer 142
 Mobility(ies) 79, 85, 86, 87, 95, 102,
 106, 108, 121
 Model(s) 35, 80, 115, 143
 Model tar 70, 71, 72, 141
 Moisture content 1, 2, 3, 4, 8, 67, 69
 Mound kiln 20
 Municipal solid waste 39

n

Noncondensable gases 14, 52, 60
 Nonequilibrium plasma(s) 39, 72,
 75, 120
 Nonthermal plasma(s) 39, 40, 47,
 69, 70, 72, 75, 109, 111, 115,
 117, 120, 127, 129, 140, 141,
 143
 Non-transferred arc 34, 134
 Normal electrolysis 50, 52
 Number density 39, 117, 118, 120,
 122, 125

o

Open loop 137
 Optical pyrometer 142
 Oscillations 134

p

Particle-in-cell 117
 Particulate matter 19
 Permittivity 3, 81, 85, 105, 117

pH 7, 8
 Physical activation 22, 24, 29, 109, 111
 PID (proportional integral differential) 137
 Pit kiln 19, 20
 Plasma(s) 33, 35, 37, 39, 59, 60, 63, 111, 116, 119, 136
 Plasma chemistry 127
 Plasma diagnostics 141
 Plasma discharge(s) 39, 53, 63, 65, 111, 115, 121, 144
 Plasma electrolysis 49, 52
 Plasma gasification 59, 60, 63, 133, 137
 Plasma torch 33, 34, 39, 59, 68, 134, 135, 137, 138
 Poisson's equation 89, 91, 116
 Porosity 22
 Positive column 35
 Power transfer coefficient 48
 Primary (reactions) 15
 Primary air 18, 19
 Proximate analysis 2, 7, 25, 61
 Pulsed discharge 44, 141
 Pyrolysis 1, 14, 17, 18, 21, 71, 72, 75, 79, 128

q
 Quasineutrality 126

r
 Reaction rate coefficient 131
 Recombination coefficient 121
 Recombination reactions 15
 Reduction zone 16, 17
 Relative permittivity 2, 3, 81, 85, 105
 Retorts 18
 Reynolds number 92, 93

RF (radio frequency) 33, 43, 46, 47, 123, 126, 141
 Runge-Kutta 122

S
 Scharfetter-Gummel 125
 Scrubber 69
 Secondary air 18, 20, 21
 Secondary emission 42
 Secondary (reactions) 15
 Shield gas 33
 Simulations 87, 115, 120, 128, 129
 Single temperature 33, 35, 60, 115
 Slow pyrolysis 14
 Spark generator 35
 Specific heat 1, 4, 6, 81
 Stabilization 42, 133
 Staggered grid 125
 Streamer 41, 44, 45
 Surface area 7, 8, 9, 22, 25, 110
 Syngas (Synthesis gas) 16, 59, 60, 61, 70, 129

t
 Tars 16, 17, 63, 69, 70, 71, 72, 75, 129
 Temperature distribution 21, 102
 Thermal conductivity 1, 3, 6, 36, 37, 79, 81, 85, 87, 105
 Thermal oxidizers 20
 Thermal plasma(s) 33, 67, 69, 74, 115, 133
 Thermal runaway 46, 67, 81
 Thermochemical process 16, 17, 69, 137
 Thermophysical properties 1
 TLUD (Top-Lit UpDraft) 20
 Torrefaction 1, 14, 59
 Townsend discharge 40
 Transferred arc 33
 Transpiration-stabilized arc 133

U

Ultimate analysis 2, 25, 61, 64
Unstable 135, 137
Updraft gasifier 16, 17
UV radiometer 142

V

Valence band 85
Volatile(s) 2, 15, 18, 21, 66, 67

Voltage(s) 14, 59, 60, 66, 68, 72, 79,
80, 81, 83, 89, 91, 94, 97, 126,
135
Vortex-stabilized arc
134, 141

W

Wall-stabilized arc 133
Wavenumber 117