

Index

- air entrainment (see entrainment)
- air-fuel mixing 119
- Arrhenius equation 197
- atom balance 195
- atomization 60, **130**
 - sheet~ **146**
- autoignition 94, **209**

- Biot number 173
- blob-injection model 137
- blowby 12
- Borghì diagram 203
- boundary layer
 - thermal~ 115
 - thickness 84
 - velocity~ 113
- Boussinesq approximation 108
- burning rate (see heat release rate, mass burning rate)

- cavitation 132, 139
- charge purity 29
- chemical equilibrium **193**, 197
- chemical explosion 206
- chemical potential 194
- closure problem 108, 238
- coherent flame model 226
- compression work 12
- computational expenditure 41
- conservation equations 101
- continuity equation (see mass conservation)
- continuous thermodynamics 174
- continuum droplet model 124
- control volume 5, 102
- cool flames 208, 210
- crank mechanism 13
- Cummins engine model 47
- cutoff length scale 106, 227
- cycle-by-cycle variations 107, 216

- Damköhler number 203
- delivery ratio 29
- diffusion combustion 63, 67, **228**
- direct injection engines 3, 119
- direct numerical simulation 104
- discharge coefficient 9, 148
- discrete droplet model 124, 185, 186
- DISI engines 241
- drag
 - coefficient 127
 - force 121, 126, 159
- droplet
 - breakup **153**
 - breakup regimes 153
 - breakup time 138, 149, 156, 158
 - coalescence 121, **161**
 - collision 121, **161**, 184
 - diffusion-limit model 173, 180
 - distortion 127, 155
 - evaporation **60**, **172**
 - infinite-diffusion model 173
 - kinematics 126
 - size 119, 137, 138, 150, 157, 170
 - vortex model 173

- eddy-breakup models 222
 - (see also time scale models)
- eddy-diffusion model 108
- eddy-viscosity model 108
- Einstein convention 102
- emission formation (see pollutant formation)
- end gas 92, 94
- energy conservation 6, 7, **103**, 117
- ensemble-averaging 225
- enthalpy of formation 194
- entrainment
 - model 91, 222
 - rate 51, 59
- equation of state 6

- equilibrium constant 195, 197
exhaust gas aftertreatment 256
exhaust gas composition 255
expansion work 12
explosion diagram 207
- Favre-averaging 225
- flame
- laminar surface area 217
 - regimes 202, 204
 - surface area 88, 92
 - surface density 226
 - turbulent stretch 204, 226
 - turbulent surface area 217
 - turbulent wrinkling 204, 217, 225
 - types (see flame regimes)
- flame area evolution models 224
- flame front 72, 88, 202, 242
- fractal model 227
- flame speed 216
- laminar 89, 247
 - thermal expansion effects 244
 - turbulent 90, 217
- flamelet models **230**
- flamelet library 231, 237
 - mixture fraction pdf 232
 - representative interactive flamelets 237
 - χ -pdf 235
- flamelet regime 222
- flammability limits 207
- flash boiling 180
- fuel
- composition **174**
 - concentration 48, 55
 - evaporation 61, 119, **171**, 180
(see also droplet evaporation)
 - injection 11
 - multi-component~ 174, 181, 277
- gas exchange 8
- gas jet theory 47
- G-equation model **224**, 246
- Gibbs free energy 193
- grid dependencies 116, **181**, 276
- reduction of ~ 183
- HACA sequence 270
- heat flux profiles 87
- heat release 200
- analysis 35
 - rate 16, 35, **43**, 44, 56, 62, 65, **88**
(see also mass burning rate)
- heat transfer 6, **14**, 52, 63, **77**, **112**
- coefficient 14, 83
 - conduction 104
 - convective 14, 81, 112
 - radiative 77, 84
 - soot layer insulation 80
- hollow-cone spray 146
- ICAS-model 184
- ideal gas 6, 23, 25
- ignition **205**
- autoignition 94, **209**
 - delay 21, 62, 70, 72, 208, 209
 - induction time 206
 - integral 23, 62
 - spark ignition **213**
- ignition kernel **214**, 243
- incompressible fluid 102
- injection
- rate profile 11
 - velocity 58, 148
- integral length scale (see turbulent scales)
- internal energy 23
- Karlovitz number 203
- Kelvin-Helmholtz model 135, 158, 160
- knock 88, **92**, 212
- induction time 95
 - integral 94
- Kolmogorov scales
(see turbulent scales) 203
- Kronecker delta 52
- k- ϵ model 109
- Laplace number 167
- large eddy simulation 105
- length scale limiter 183
- marker particles 243
- mass burning rate 67, 70, 88, 91, 215, 223, 244 (see also heat release rate)
- mass conservation 5, 7, **101**, 117
- mass diffusion 61
- mixing stoichiometry 73
- mixing-length model 109
- mixture fraction 231
- model categories 2, 41

- momentum conservation 53, 59, **103**,
 117
 Monte-Carlo technique 124, 240
 multidimensional models 2, 119, 193,
 275

 Navier-Stokes equations 103
 negative temperature coefficient 208
 Newtonian fluid 103
 non-equilibrium turbulence model 111
 non-premixed combustion (see
 diffusion combustion)
 NO_x formation 32, 76, 236, **257**
 mechanisms 257
 prompt NO 260
 thermal NO 34, **258**
 Nusselt number 14, 61
 N-zone models 75

 Ohnesorge number 132

 packet model 57, 76
 partial equilibrium 196, 200
 partially premixed combustion 241
 particulate matter (see soot)
 pdf-models 238
 presumed pdf 240
 transported pdf 239
 phenomenological models 2, **41**, 276
 pilot-injection (see pre-injection)
 plasma velocity 219, 244
 pollutant formation 41, 72, 76, 199, 255
 polycyclic aromatic hydrocarbons 261,
 270
 polygon-hyperbola combustion profile
 19
 pre-injection 65, 69
 timing 72
 premixed combustion 57, 63, 65, 67,
222
 pressure swirl atomizer 146
 probability density function 122, 231,
 239
 joint pdf 239, 240

 quasi-dimensional models (see
 phenomenological models)
 quasi-steadiness 200, 259

 Rayleigh-Taylor model 159

 reaction
 kinetics 196
 mechanisms 198
 rate 197, 198
 rate coefficient 197
 real gas effects 26
 regress variable 225
 restitution coefficient 170
 Reynolds averaging 107
 Reynolds number 14, 48, 127, 132, 154,
 202
 Reynolds stress models 111
 Reynolds stress tensor 108
 RNG k - ϵ model 111

 Sauter mean diameter 60
 scalar dissipation rate 232, 234, 236,
 237
 scavenging efficiency 11, 29
 Shell-model 209
 Sherwood number 61
 single-zone model 6
 soot
 comprehensive models 269
 eight-step model 266
 formation 77, **261**, 277
 oxidation 264
 particle properties 261
 T-/composition dependency 262
 temporal concentration profile 263
 two-step model 264
 soot layer insulation 80
 soot radiation 77, 84
 source terms 116, 123
 spark discharge 88, 213
 spark ignition **213**, 243
 spark plug protrusion 221
 spatial resolution 182
 spray **119**
 angle 48, 54, 60, 137, 141, 143, 156
 packets 58
 penetration 47, 54, 65, 67
 regimes 120
 velocity 54, 58
 spray breakup
 breakup length 134, 137, 149, 161
 breakup time 58
 primary~ 131, 139, 276
 (see also atomization)
 regimes 131
 secondary~ (see droplet breakup)

- spray equation 122
- squish flow 82
- statistical convergence 182, 184, 185, 240, 277
- stochastic particle technique 124, 182
- stoichiometric coefficient 193
- Stokes' postulation 103
- stratified charge 241
- stress tensor 103
- surface perturbations 136, 148
- swirl 48, 53, 82
- systems analysis 35

- Taylor series 101
- Taylor-analogy breakup model 127, **155**
- thermal efficiency 88, 93, 255
- thermal explosion 205
- thermodynamic models 2, 5, 275
- time scale models 67, 224, 228, 236, 243
- transient system simulation 36
- trapping efficiency 29
- triple flame 242, 248
- turbulence
 - combustion induced 15
 - dissipation 83, 110
 - intensity 70, 90, 128, 143
 - models 109, 184, 276
 - production 68, 119
 - scales (see turbulent scales)
- turbulent
 - conductivity 108
 - dispersion 128
 - fluctuations 106, 110, 235, 238, 247
 - kinetic energy 45, 83, 91, 109, 128, 142
 - mixing 74, 76
 - strain rate 218, 235
 - viscosity 108, 109, 110
- turbulent scales
 - dissipation length scale (see integral length scale)
 - integral length scale 105, 128, 203
 - Kolmogorov length scale 105, 203
 - Kolmogorov time scale 203
 - Taylor microscale 223
 - turbulent time scale 67, 223, 229
- two-phase flow 116
- two-zone model 32, 35, 72

- void fraction 121, 182

- wall
 - friction 82
 - heat transfer (see heat transfer)
 - impingement 60, 165
 - impingement regimes 167
- wall functions 112, 114, 276
- water bell 152
- wave-breakup model 135
- Weber number 132, 153, 162, 167
- well stirred reactor 204
- Wiebe function 17

- zero-dimensional models (see thermodynamic models)