

Index

A

affine SDE, 68
almost oscillatory, 122
analytic solution, 175
analyticity problem, 174
asymptotic stability, 199
autonomous differential equation, 2

B

Barbašin-Krasovskii-La Salle theorem, 208
Borel–Cantelli lemma, 67, 69, 72
Brownian motion, 21
buffered production systems, 182

C

cell division cycle, 251
characteristic lines, 203
Chebyshev-Gauss-Lobatto points, 257
chemical reaction network, 106, 111
 linear, 114
compact imbedding, 242
comparison principle, 42, 164
complementary normal distribution function,
 29
computational efficiency, 251
control system, 197
cutting process, 179

D

decay rate, 5, 7
delay differential equation, 162, 173
 linear, 165
delay partial differential equation, 251
differential inequality, 164

Dini derivative, 44
disconjugate system, 135
discrete Itô formula, 220, 223, 225
dominant solution, 89
dual model, 183
dynamic boundary condition, 199
dynamic equivalence, 105
dynamic similarity, 116

E

energy identity, 199
energy space, 214
essentially nonnegative matrix, 162
Euler-Maruyama method, 39
exponential stability, 163, 166

F

forward difference operator, 121
functional differential equation, 233

G

Galerkin's method, 240
Gerber-Shiu function, 183

H

half-linear equation, 87
half-linear Euler equation, 98
hyperbolic functional equation, 234
hyperbolic PDE, 198

I

identically normal system, 145
infection disease transmission, 178
initial-boundary value problem, 233

initial-value problem, 256
 instability, 229
 integrodifferential equation, 184
 intermediate solution, 89, 93
 internally perturbed ODE, 7
 Itô differential equation
 delay stochastic, 220
 Itô integral, 66

L

Laplace transform, 183
 law of the iterated logarithm, 24
 Liapunov functional, 199
 limit theorems for martingales, 221
 linear chemical reaction network, 114
 linear equation, 99
 LODE-type distribution, 186
 logarithmic norm, 161
 Lotka-Volterra form, 108
 Lundberg fundamental equation, 183

M

martingale, 221
 martingale convergence theorem, 12, 60
 martingale time change theorem, 67, 71
 martingale-difference, 221
 maximal monotone, 214
 maximal monotone operator, 199, 216

N

neutral type, 121
 non-degenerate diffusion, 23
 nonautonomous linear Hamiltonian system,
 133
 nonlinear damping, 208
 nonlinear functional dependence, 234
 nonlinear second order evolution equation, 234
 nonoscillatory system, 136

O

oscillation, 88, 98
 overhead crane, 200

P

parallel algorithm, 255
 parallelization, 255
 positive polynomial system, 107
 positive system, 106
 principal function, 153

principal solution, 136
 probability of ruin, 182
 proportional derivative controller, 208
 pseudospectral differentiation matrix, 257
 pseudospectral semi-discrete system, 257

Q

qualitative properties, 233
 quasi-monomial, 107
 quasi-monomial transformation, 108
 quasi-polynomial system, 106
 quasimonotone condition, 164

R

regular perturbation, 203
 regular variation, regularly varying, 3
 Riccati
 equation, 134
 substitution, 123
 technique, 121
 Riemann-Weber equation, 100

S

scaled increment, 2, 29
 second order difference equation, 121
 second-order nonlinear differential equation,
 87
 semi-discretization, 256
 singular perturbationf, 203
 skew-product flow, 134
 stability, 166, 226
 asymptotic, 199
 exponential, 163, 166
 structural, 113
 state-dependent delay, 173, 234
 stochastic difference equation, 219
 with multiple noises, 219
 stochastic differential delay equations, 230
 stochastic differential equation, 1
 structural stability, 113
 Sturm-Liouville, 129
 subdominant solution, 89
 symplectic matrix, 135

T

threshold condition, 173
 time domain decomposition, 253
 time process, 181
 time-rescaling transformation, 109
 Toeplitz lemma, 78

transformation

quasi-monomial, 108

time-rescaling, 109

translated X-factorable, 115

translated X-factorable transformation, 115

Tychonov fixed point theorem, 95, 97

U

uniform principal solution, 136

uniform weakly disconjugate system, 135

upper semicontinuous matrix function, 153

V

variational principle of Hamilton, 199

Volterra property, 235

W

weak solution, 233

weakly disconjugate system, 135

Z

zero-one law, 76