

Index

A

algebraic equation 33
approximated inertial manifold 22

B

black-box modeling 13
block-oriented nonlinear model 41
block-oriented nonlinear models 51

C

catalytic rod 62, 86, 138, 157
Catalytic rod 3
Chebyshev polynomials 27
chemical vapor deposition reactor 29
collocation AIM 23
collocation method 22
coupled map lattice system 33
curing process 1

D

difference equation 35
diffusion-convection-reaction
 process 29
Dirac delta functions 22
distributed parameter systems 1

E

EF-Galerkin method 26
EF-Galerkin-AIM method 27
Eigenfunction method 16
eigenfunctions 16, 25
eigenspectrum 26
empirical eigenfunctions 27
equation error 31
error reduction ratio 80

F

fading memory nonlinear system 123
finite difference method 5
Finite difference method 17
finite element method 5
Finite element method 24
first-principle modeling 13
fluid flow 29
Fourier series 18, 25

G

Galerkin AIM 23
Galerkin method 21
Green's function 124
Green's function method 17
grey-box modeling 13

H

Hammerstein distributed parameter
 system 74, 97
Hammerstein model 6, 51
Hermite polynomials 27

I

implicit Euler method 23
inertial manifold 22
instrumental variables method 52, 60

K

Karhunen-Loève decomposition 52, 54
Karhunen-Loève method 5, 27
KL-collocation method 29

KL-Galerkin method 29
 KL-Galerkin-AIM method 29

L

Laguerre functions 58
 Laguerre polynomials 27
 lattice dynamical system 35
 least-squares estimate 59
 least-squares estimation 52
 Least-squares estimation 83, 101
 left singular functions 28
 Legendre polynomials 27
 linear regression 33
 linear time-invariant system 52
 lumped parameter systems 5

M

mean of absolute relative error 29
 method of characteristics 27
 method of lines 18
 method of snapshots 56
 model reduction 13
 multi-channel Hammerstein system 103

N

Navier-Stokes equation 33
 NL-PCA 153
 nonlinear autoregressive with exogenous input model 35
 Nonlinear parabolic process 15
 nonlinear principal component analysis 6

O

ordinary differential equations 5
 orthogonal collocation method 22
 orthogonal forward regression 35, 74
 Orthogonal forward regression 80
 orthogonal least-squares 34
 orthogonal polynomials 22
 Orthogonal polynomials 27
 output error 31

P

packed-bed reactor 113
 Packed-bed reactor 4
 parabolic PDE 4
 parameter estimation 13
 partial differential equation 2
 piecewise polynomials 24
 piecewise polynomials-Galerkin method 24

polynomial-collocation method 27
 principal component analysis 27
 Principal component analysis 151
 proper orthogonal decomposition 27

Q

Quasi-linear parabolic process 14

R

radial basis functions 58
 regularization error 32
 right singular functions 28
 Root of mean squared error 62, 113, 138

S

self-adjoint 17
 separation of variables 16
 signal-to-noise ratio 113
 single-channel Hammerstein system 103
 singular perturbations method 23
 singular value decomposition 27
 Singular value decomposition 83, 101
 snap curing oven 1, 65, 89, 116, 141, 160
 spatial basis functions 18
 Spatial correlation method 55
 Spatial normalized absolute error 62, 86, 113, 138
 spatial two-point correlation function 28
 spatio-temporal Hammerstein model 9
 spatio-temporal neural model 9
 spatio-temporal Volterra model 9, 125
 spatio-temporal Wiener model 9
 spectral method 5, 25
 spill-over effects 21
 spline-Galerkin method 24
 splines 24
 steady manifold 23
 system identification 13

T

Temporal correlation method 56
 Temporal normalized absolute error 62, 86, 113, 138
 temporal two-point correlation function 28
 thermal process 29
 thermal processes 1
 time/space coupled 5
 time/space separation 52
 Time/space separation 127

V

Volterra model 6, 124

W

wavelet-collocation method 24
wavelet-collocation-AIM method 24

wavelet-Galerkin method 24
wavelet-Galerkin-AIM method 24
wavelets 24
weighted residual method 18
weighting functions 20
White-box modeling 16
Wiener distributed parameter system 52
Wiener model 6, 51