33-bus distribution system, 265	bubble-net feeding, 332
	butterfly adjusting operators, 258
acceleration, 274	butterfly flutter, 259
acceleration coefficients, 278	
accuracy, 142	Cartesian distance, 177
ACO, 2	Cat Swarm Optimization, 58
active recruitment mode, 316	centroid strategy, 44, 47
Activity-based criterion, 318	Chaos-based FA, 179
adaptive, 30	chaotic circle, 166
Adaptive chemotaxis, 35	Chaotic Crow Search Algorithm, 104
agent hypothesis, 314	Chaotic KH, 244
algorithm adaptation, 97	chaotic mapping, 44, 48
amplitude characteristics, 279	chaotic maps, 166, 179, 218, 305, 334
annual energy losses, 36	chaotic sequence, 167
ant colony, 2	chase-swarming, 92
Ant colony optimization, 2	chemotaxis, 30
attraction operator, 206	chicken, 76
attractiveness coefficient, 177	Chicken Swarm Optimization, 76
	chicks, 76
bacteria, 30	clan, 164
Bacterial Forging Optimization, 29	Clan updating operator, 165
Bat Algorithm, 133	classification accuracy, 155
bat algorithm, 44	clustering, 196
battery energy storage system, 168	cockroach swarm optimization, 91
behavior of krill, 242	cognition part, 278
Behavior switching modification, 189	collective intelligence, 15
benchmark function, 258	Combinatorial optimization, 19
best fitness value, 141	combinatorial optimization
Binary Crow Search Algorithm, 104	problems, 229
binary optimization, 206, 291	combinatorial problem, 37
binary problem, 25	comfort zone, 205
bio-inspired, 44, 45	communal web, 302
biography-based krill herd, 248	communication strategies, 314
boundary mapping problem, 195	computational intelligence
breaking or weakening, 147	algorithms, 91
brood parasitism, 120	Constrained optimization, 21
bubble-net attacking, 332	constraint handling ABC, 21

constriction coefficient, 278	economic load dispatch, 306
Context free mechanism, 318	EHO, 164
Context sensitive mechanism, 317	elephant, 163
continuous, 16	elimination, 30
continuous optimization, 204	employed bee, 18
convergence characteristic, 137	engineering optimization, 258
convergence probability, 136	estimated model, 139
convergence speed, 137, 141	Euclidean distance, 204
cooperative breeding, 120	excitation signal, 139, 142
correction-cooperation, 232	exploitation, 146
Coverage maximization, 192	exploiter bat, 133, 134
crossover operators, 98	exploration, 146
Crow Search Algorithm, 103	explorer bat, 133, 134
cuckoo search optimization, 120	
	falls detection, 82
damping coefficient, 139	fast convergence, 278
Deb's rules, 21	Fast Fourier Transform, 280
deep neural network, 152	feasible solutions, 21
DER, 36, 164	feasible space, 21
design of retaining walls, 249	female cooperative operator, 306
DG, 258	filter coefficients, 280
diesel generator , 168	firefly algorithm, 175
Diffusion Phase, 314	fitness, 139
digital filters, 279	fitness function, 58
Discrete FA, 178	flagella, 30
dispersal, 30	flashing characteristics, 175
dispersal probability, 30	food, $30$
dispersion, 92	food source, 2
dispersive flies optimisation, 146	foraging, 30
distributed energy resources, 164	foraging activity, 242
distribution network reconfiguration,	foraging behaviour, 30
44	forceful reproduction strategy, 120
distribution systems, 36, 258	formation of the swarms, 147
Disturbance threshold, 150	frequency, 45, 46, 48, 49, 51, 134
double-loops, 332	
dual recruitment mode, 316	global best, 58
DVBA, 133	global optima, 136
dvba, 134	global solution, 259
dynamic motion, 203	global version, 76, 274
Dynamic Virtual Bats Algorithm,	Glowworm Swarm Optimization, 187
133	GOA-based clustering, 208
	Gradient free cuckoo search, 123
E. coli, 30	Grasshopper Optimization
echolocation, 134	Algorithm, 203
economic dispatch, 164	greedy selection, 18

greedy strategy, 258	local random walk, 45, 47
grey wolf optimizer, 216	local search, 18
grey wolves, 216	local trapping, 35
GSTM operator, 19	local version, 274
	loudness, 45–49, 51
hens, 76	luciferin update phase, 188
herd, 164	
herding behaviour, 164	male cooperative operator, 306
humpback whales, 332	Mantegna algorithm, 234
hunger component, 92	matriarch, 163
hunting behaviors, 332	mean, 141
hunting group, 231	microgrids, 164
Hunting search algorithm, 229	migration operator, 258
	minimalist algorithm, 146
identification, 142	minimalist swarm algorithms, 146
identify metastasis in bone scans, 320	minimalist update equation, 146
identify parameters, 138	minimize, 139
IDVBA, 134	mixed-integer, 265
idvba, 136, 138, 139	modification rate, 19
IEHO, 167	Modified Crow Search Algorithm,
IIR digital filter, 279, 282	104
impulse signal, 139, 142	monarch, 258
inertia weight, 277	monarch butterfly optimization, 258
infeasible solutions, 21	movement performance, 92
insect form, 203	movement phase, 188
Intensive Care Units, 151	multi-machine power system, 120
intra-specific brood parasitism, 120	multi-objective ABC, 22
isotropic, 234	Multi-objective FA, 181
TZ 1 111 011	Multi-stage KH, 246
K-means algorithm, 211	multimodal function, 279
krill density, 242	multimodal problems, 279
krill herd, 242	multiple source localization, 194
Lévy flights, 180	nature inspired, 58
Lagrangian model, 242	nature inspired algorithms, 76
larvae stage, 203	nearest neighbors, 274
leader, 163, 232	neighborhood range update phase,
learning factors, 274	188
Levy flight, 260	neighborhood scheme, 92
Levy flight procedure, 234	neighborhood search, 175
Levy-flight, 335	neighborhood topology, 274
Levy-flight KH, 245	nest takeover, 120
like salp swarms, 287	Next Release Problem, 24
local best, 58	non-convex, 265
local optima, 136	non-linear, 265
Local optima mapping, 191	normalized frequency, 282

North American, 258	role-based search, 133
noxious environment, 30	roosters, 76
nutrient, 30	ruthlessness, 92
objective function, 76, 139	Salp Swarm Algorithm, 286
offspring, 259	scout bee, 18
onlooker bee phase, 18	search scope, 134
operating cost, 164	search space, 80
optimal DG allocation, 267	search waves, 134
optimization engineering problem,	seeking mode, 58
290	seismic waves, 164
optimization issues, 287	selecting the requirements, 24
optimization problem, 58	self adaptive crossover operation, 258
optimization problems, 80	
,	self-adaptive bat algorithm, 44, 47,
parameter estimation, 139	48, 55
parasitized breeding mechanism, 120	Separating operator, 165
particle swarm optimization, 273	Shallow footings, 338
passive recruitment mode, 315	shallow foundation, 339
PER, 45	signal source localization, 197
pheromone trails, 3	signals, 164
position, 58	sinusoidal maps, 166
power generation, 306	slow convergence, 278
power loss, 266	slow movements, 203
power system stabilizer, 124	small vibrations, 302
Pressure vessel design, 220	smart bat algorithm, 49, 55
prey, 45	social part, 279
- * *	social spider optimization, 301
probabilistic selecton restart	social spiders, 302
techniques, 136	solar photovoltaic, 168
quadratic interpolation, 337	solitary life, 163
quarter-car model, 138	source of food, 203
	speed reducer design, 221
quaternion-based representations, 181	spiral-shape path, 332
101	sprung mass, 139
random diffusion, 242	stable filter, 283
random fly, 45	standard deviation, 141
random flying probability, 136	step size, 141
random walk, 234	stochastic constriction factor, 92
Randomly attracted FA, 180	Stochastic Diffusion Search, 313
	Strong halting criterion, 319
rastrigin, 137	Stud KH, 247
reaching food, 242	sum of square error, 139
real system, 139	sum of square error, 139 suspension stiffness, 139
reproduction, 30	<del>-</del>
repulsion, 302	suspension system, 138
repulsion zone, 205	Swarm Intelligence, 286

swarm intelligence, 273	velocity, 44, 45, 58
swarm robotic platforms, 193	Velocity clamping, 277
swarming, 30, 164	velocity update, 277
swimming, 30	velocity vector, 276
	vertical force, 138
tension compression spring, 223	vibrations, 303
termination criteria, 276	voltage profiles, 36
Test Phase, 314	
three-bar truss design, 222	wave vectors, 134
tire stiffness, 139	wavelength, 134
tracing mode, 58	Weak halting criterion, 319
transfer function, 279	Welded beam design, 219
tropical fireflies, 175	welded beam design, 292
tumbling, 30	welded beam design problem,
	234
unconstrained, 16	whale optimization algorithm,
uniform distribution, 165, 259	332
uniform probability distribution, 34	wireless networks, 196
unimodal problems, 279	worst fitness value, 141
unitary circle, 282	
upward-spirals, 332	zone of attraction, 205