DEVELOPMENT OF ARTIFICIAL BEE COLONY (ABC) VARIANTS AND MEMETIC OPTIMIZATION ALGORITHMS

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by

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LIST OF ABBREVIATIONS

ABC	Artificial bee colony algorithm
ACO	Ant colony optimization algorithm
AI	Artificial intelligence
AIA	Artificial immune algorithm
ANN	Artificial neural network
BABC	Global best ABC algorithm
BIAs	Bio-inspired algorithms
BP	Band-pass
BS	Band-stop
BsfABC	Best-so-far ABC algorithm
BSO	Bee swarm optimization algorithm
CI	Computational intelligence
CLONALG	Clonal selection algorithm
CLPSO	Comprehensive learning PSO
CS	Cuckoo search algorithm
DE	Differential evolution
EA	Evolutionary algorithm
EABC	Enhanced ABC algorithm
EDA	Estimation of distribution algorithm
EED	Economic Environmental Dispatch
EGA-DQLF	Enhanced GA with decoupled quadratic load flow
EGS	Evolutionary gradient search
EP	Evolutionary programming
EPS-ABC	Enhanced Probability-Selection ABC algorithm

ES	Evolutionary strategies
FIR	Finite impulse response
GABC	Gbest-guided ABC algorithm
GRABC	Gbest-influenced random ABC algorithm
HABC	Hooke-Jeeves pattern search ABC algorithm
HP	High-pass
HRABC	Hybrid robust ABC algorithm
HS	Harmony search algorithm
HSABCA	Hybrid simplex ABC algorithm
HTCMIABC	Hybrid Taguchi-chaos of multilevel immune ABC algorithm
IABC	Improved ABC algorithm
IIR	Infinite impulse response
LP	Low-pass
MABC	Modified ABC algorithm
MAs	Memetic algorithms
MBABC	Multiple gbest-guided ABC algorithm
MBO	Marriage in honey bees optimization algorithm
MDE	Modified DE
MIA	Multilevel immune algorithm
MODE	Multi objective differential evolution
MSBA	Mutable smart bee algorithm
mTSP	Multiobjective travelling salesman problem
NM	Nelder-Mead
NMSS	Nelder-Mead Simplex Search
NP	Non-deterministic polynomial time

NSGA	Nondominating sorting GA
PDE	Pareto differential evolution
PS-ABC	Probability-selection ABC algorithm
PSO	Particle swarm optimization algorithm
PSO-cf	PSO with constriction factor
RABC	Rosenbrock ABC algorithm
RCGA	Real coded genetic algorithm
RM	Rosenbrock rotational direction method
RPO	Reactive power optimization
SaDE	Self-adaptive DE
SARGA	Self-adaptive real coded GA
SI	Swarm intelligence
SPEA	Strength pareto EA
TSMA	Two-stage ensemble memetic algorithm

LIST OF SYMBOLS

a_i	Cost coefficient of EED
a_k	First-order coefficients of
B_{00}	Loss-coefficient constant of EED
b_i	Cost coefficient of EED
B_{i0}	Loss-coefficient-vector of EED
$B_{ij(EED)}$	Loss-coefficient-square-matrix of EED
$B_{ij(RPO)}$	Susceptance between bus *i* and *j* of RPO
b_k	First-order coefficients
C	Nonnegative constant used in GABC
c_i	Cost coefficient of EED
c_{k1}	Second-order coefficients
c_{k2}	Second-order coefficients
D	Dimension of search space
d_i	Fuel coefficient of EED
d_{i1}	Second-order coefficients
d_{i2}	Second-order coefficients
e_i	Fuel coefficient of EED
f_b	Fitness values of best-so-far food source used in BsfABC
f_i	Values of objective function of *i*-th food source
fit_i	Fitness values of *i*-th food source
g	Offspring used in EGS
g_{ij}	Conductance between bus *i* and *j* of RPO
H_p	Passband magnitude response error
H_s	Stopband magnitude response error

K	Penalty term of EED
L	Number of local neighbors used in EGS
M	Random positive number used in IABC
MCN	Maximum cycle number
N_{bus}	Total number of the system's buses of RPO
N_{gen}	Total number of generator unit of EED
N	Normal distribution used in EGS
NC	Number of shunt compensator of RPO
NG	Number of generators of RPO
NL	Total number of transmission lines of RPO
NT	Number of transformer of RPO
p	Control parameter used in IABC
P	Selective probability used in MABC
P_D	Active power demand of EED
P_{Di}	Active power demand at bus i of RPO
P_{Gi}	Active power generation at bus i of RPO
P_{Gi}^{min}	Lower limit of active power generation at bus i of RPO
P_{Gi}^{max}	Upper limit of active power generation at bus i of RPO
P_i	Probability of i-th food source
$P_{i(EED)}$	Power generated at i-th generator of EED
P_L	Transmission line losses of EED
P_{loss}	Power transmission loss of the power system of RPO
P_n	Sampling frequency in the passband
Qc_i	Shunt compensation at bus i of RPO
Qc_i^{max}	Upper limit of active shunt compensation at bus i of RPO

Qc_i^{min}	Lower limit of shunt compensation at bus *i* of RPO
Q_{Di}	Reactive power demand at bus *i* of RPO
Q_{Gi}	Reactive power generation at bus *i* of RPO
rand	Random number in the range of [0,1]
S_n	Sampling frequency in the stopband
SN	Number of food sources
T	User-defined number used in JA-ABC5a
T_i	Transformer tap settings of transformer *i* of RPO
T_i^{max}	Upper limit of transformer tap settings of transformer *i* of RPO
T_i^{min}	Lower limit of transformer tap settings of transformer *i* of RPO
V_i	Voltage magnitude at bus *I* of RPO
V_i^{max}	Upper limit of voltage magnitude at bus *i* of RPO
V_i^{min}	Lower limit of voltage magnitude at bus *i* of RPO
V_j	Voltage magnitude at bus *j* of RPO
$y_{best,j}$	Best-so-far food source with *j*-th dimension
$y_{best,m}$	Best-so-far food source with *m*-th dimension in IABC
y_{bj}	Best-so-far food source with *j*-th dimension in Bsf ABC
y_i	Initial solution of EGS technique
y_{ij}	Food source to be updated with *j*-th dimension
y_{im}	Food source to be updated with *m*-th dimension in IABC
y^i_i	Food source to be replaced in scout-bee phase
y^j_{max}	Upper limit of search space
y^j_{min}	Lower limit of search space

y_{kj}	Randomly chosen *k*-th food source with *j*-th dimension
y_{km}	Randomly chosen food source with *m*-th dimension in IABC
y_{mj}	Randomly chosen *m*-th food source with *j*-th dimension
y_{nj}	Randomly chosen *n*-th food source with *j*-th dimension
y_{pm}	Randomly chosen food source with *m*-th dimension in IABC
y_{r1j}	Randomly chosen *r1*-st food source with *j*-th dimension
y_{r2j}	Randomly chosen *r2*-nd food source with *j*-th dimension
y_{r3j}	Randomly chosen *r3*-rd food source with *j*-th dimension
y_{r4j}	Randomly chosen *r4*-th food source with *j*-th dimension
y_{pm}	Selected best solution in enhanced EGS technique
z_i	Local neighbor to be generated in EGS technique
z_{ij}	Candidate solution with *j*-th dimension
z_{im}	Candidate solution with *m*-th dimension
α_i	First emission coefficient of EED
β_i	Second emission coefficient of EED
γ_i	Third emission coefficient of EED
δ_i	Fourth emission coefficient of EED
η_i	Fifth emission coefficient of EED
θ_{ij}	Angle difference of *ij*-th transmission line of RPO
ε	Control parameter used in EGS
$\hat{\upsilon}$	Global gradient direction used in EGS
ϕ_{ij}	Random number in the range of [-1,1]
Φ	Random number in the range of [-1,1] used in BsfABC
σ_t	Step size used in EGS