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LIST OF SYMBOLS AND ABBREVIATIONS

Symbols

$\theta_{i,j}$	-	Angle of bus admittance matrix element i,j
$G_{best\ i}$	-	Best position among the particles
$P_{best\ i}$	-	Best position of i^{th} particle
Y_{ij}	-	Bus admittance matrix element i,j
c_1	-	Coefficient of the self-recognition component
c_2	-	Coefficient of the social component
V_j	-	Complex voltage at bus j
$g_{i,j}$	-	Conductance of line i-j
c_i	-	Cost coefficient of i^{th} generator
b_i	-	Cost coefficient of i^{th} generator ($/MWh)
a_i	-	Cost coefficient of i^{th} generator ($/MWh^2)
C_{SVC}		Cost of SVC in $/VAR
I_G	-	Current at Generator bus
I_L	-	Current at Load bus
iter	-	Current iteration number
S_i^{k+1}	-	Current position of particle i at $(k+1)^{th}$ iteration
S_i^{k}	-	Current position of particle i at k^{th} iteration
w_{max}	-	Final value of inertia weight
w	-	Inertia weight
w_{min}	-	Initial value of inertia weight
S_L	-	Line flow
$iterw_{max}$	-	Maximum iteration number
S_{Limax}	-	Maximum limit of power flow of the line i
Q_{Gi}^{max}	-	Maximum limit of reactive power generation of bus i

Q_{SVC}^{max}	-	Maximum limit of reactive power of SVC
P_{Gi}^{max}	-	Maximum limit of real power generation of bus i
T_i^{max}	-	Maximum limit of tap position of transformer i
$\left\|V_i^{max}\right\|$	-	Maximum limit of voltage magnitude of bus i
$F_i(x,u)$	-	Minimization of i^{th} objective function
Q_{Gi}^{min}	-	Minimum limit of reactive power generation of bus i
Q_{SVC}^{min}		Minimum limit of reactive power of SVC
P_{Gi}^{min}	-	Minimum limit of real power generation of bus i
T_i^{min}	-	Minimum limit of tap position of transformer i
$\left\|V_i^{min}\right\|$	-	Minimum limit of voltage magnitude of bus i
Q_2	-	MVAR flow after placing FACTS device
Q_1	-	MVAR flow before placing FACTS device
N	-	Number of buses
nG	-	Number of generators
nPQ	-	Number of PQ buses
nPV	-	Number of PV buses
nT	-	Number of tap changing transformers
N_L	-	Number of transmission lines
S	-	Operating range of SVC
V_i^{ref}	-	Prespecified reference value of the voltage magnitude
$rand_1$	-	Random numbers between 0 and 1
$rand_2$	-	Random numbers between 0 and 1
Q_{Di}	-	Reactive power demand at bus i
Q_{Gi}	-	Reactive power generation at bus i
Q_{SVC}	-	Reactive power rating of SVC
P_{Di}	-	Real power demand at bus i
P_{Gi}	-	Real power generation at bus i
P_{loss}	-	Real power loss
α_G	-	Set of generator buses

α_L	-	Set of load buses
B_{SVC}	-	Susceptance value of SVC
T	-	Tap position
V_i^{k+1}	-	Velocity of i^{th} particle at $(k+1)^{th}$ iteration
V_i^k	-	Velocity of i^{th} particle at k^{th} iteration
δ_i	-	Voltage angle at bus i
$\|V_i\|$	-	Voltage magnitude of bus i
$\|V_j\|$	-	Voltage magnitude of bus j
L_{max}	-	Voltage stability index
L_j	-	Voltage stability index value of load bus j
h_i	-	Weigthing factor of i^{th}objective function

Abbreviations

ACO	-	Ant Colony Optimisation
BSA	-	Bacterial Swarming Algorithm
CPF	-	Continuation Power Flow
CSI	-	Contingency Severity Index
ECI	-	Equivalent Current Injection
FACTS	-	Flexible AC Transmission System
GA	-	Genetic Algorithm
IEEE	-	Institute of Electrical and Electronics Engineers
IPFC	-	Inter line Power Flow Controller
ISO	-	International Organization for Standardization
MOPSO	-	Multi-Objective Particle Swarm Optimization
NSGA	-	Non-dominated sorting genetic algorithm
NSPSO	-	Non-dominated Sorting Particle Swarm Optimization
OPF	-	Optimal Power Flow
p.u.	-	Per Unit
PSAT	-	Power System Analysis Toolbox

PSO	-	Particle Swarm Optimization
PSOGA	-	Particle Swarm Optimization Genetic Algorithm
SSSC	-	Static Synchronous Series Compensator
STATCOM	-	Static Synchronous Compensator
SVC	-	Static VAR Compensator
SVSM	-	Static Voltage Stability Margin
TCPAT	-	Thyristor Controlled Phase Angle Transformer
TCPST	-	Thyristor Controlled Phase Shifting Transformer
TCSC	-	Thyristor Controlled Series Capacitor
TCSR	-	Thyristor Controlled Series Reactor
TCVR	-	Thyristor Controlled Voltage Regulator
TSSC	-	Thyristor Switched Series Capacitor
TSSR	-	Thyristor Switched Series Reactor
UPFC	-	Unified Power Flow Controller
VD	-	Voltage Deviation