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LIST OF ABBREVIATION

ADN	Active Distribution Network
BESS	Battery energy storage system
FMOO	Fuzzy Multi-Objective Optimization
LV	Low Voltage
NRLF	Newton-Raphson Load Flow
PSO	Particle Swarm Optimization
PV	Photovoltaic
SoC	State of Charge
TSoC	Total SoC deviation
TVD	Total voltage deviation
VC	Voltage Collpse
VD	Voltage Deviation
VDC	Voltage Droop Control
VI	Voltage Instability
VP	Voltage Profile
VS	Voltage Stability
VSI	Voltage Stability Index

LIST OF NOMENCLATURE

$\mathbf{I^G}$	current at generator bus
$\mathbf{I^L}$	current at load bus
$\mathbf{V^G}$	voltage at generator bus
$\mathbf{V^L}$	voltage at load bus
g	the total number of generators
L_j	the L-index value of the bus
V_i	the voltage at the generator bus
V_j	the voltage at the load bus j
F_{ij}	the element of the $\mathbf{F_{LG}}$ matrix obtained by (3.9)
$\mathbf{Y_{LL}}$ and $\mathbf{Y_{LG}}$	the submatrix of $\mathbf{Y_{bus}}$
$\mathbf{F_{LG}}$	the Y-bus converting matrix
P_{BES}	The electrical power that a battery charges or discharges
$P_{BES}^{\max}$	The maximum power that the battery can supply.
$k_{BES,c}$	The droop coefficient controls energy charge.
$k_{BES,d}$	The droop coefficient controls energy discharge.
ΔV	voltage deviation
V_k	Bus voltage
V_0	Nominal voltage
V_h	The sum of Voltage deviation 24 hour
$V_{\text{th}}^{\min}$	The minimum voltage thresholds
$V_{\text{th}}^{\max}$	The maximum voltage thresholds
$V_{\min}$	The minimum voltage

LIST OF NOMENCLATURE (Continued)

$V_{\max}$	The maximum voltage
$K_{\max}$	The maximum droop coefficient
$K_{\min}$	The minimum droop coefficient
n_d	The adjust exponent for $k_{BES,d}$
n_c	The adjust exponent for $k_{BES,c}$
$SoC(t)$	state of charge at the current step
$SoC(t-1)$	state of charge at the previous step
E	Battery capacity
N	Number of buses
SoC	State of charge
SoC	The sum of SoC 24 hour
$SoC_{\min}$	Minimum state of charge
$SoC_{\max}$	Maximum state of charge
$P_{BES,\min}$	The minimum power that the battery can supply
$P_{BES,\max}$	The maximum power that the battery can supply
Z	Number of batteries
h	The hour
P_{SoC}	The power of SoC restoration
$P_{SoC,\max}$	The maximum power of SoC restoration
$P_{SoC,\min}$	The minimum power of SoC restoration
$P_{SoC,d}$	The discharge power of SoC restoration
$P_{SoC,c}$	The charge power of SoC restoration
n_{ds}	The adjust exponent for $P_{SoC,d}$
n_{cs}	The adjust exponent for $P_{SoC,c}$

LIST OF NOMENCLATURE (Continued)

n_s	The adjust exponent of SoC restoration
$pBest_i$	The best value of each particle i
$gBest$	The best value of all particles
t	The iteration
v_i	The velocity for a particle i
c_1 and c_2	Constant numbers
r_1 and r_2	Random parameters
w	Inertial weight
x_i	The population of particles
$TSoC_{\max}$	The maximum total SoC deviation
$TSoC_{\min}$	The minimum total SoC deviation
$TVD_{\max}$	The maximum total voltage deviation
$TVD_{\min}$	The minimum total voltage deviation
μ_T	The membership function
μ_{TSoC}	The membership function of total SoC deviation
μ_{TVD}	The membership function of total voltage deviation