

# List of Symbols

<i>Symbol</i>	<i>Description</i>
$\Delta$	Determinant of a matrix
$D(t)$	Influence of rest of the system on a particular converter
$b_{bdc}$	Fraction of total load current supplied or drawn by BDC
$b_j$	Fraction of total load current supplied by $j^{th}$ RES converter
$C_{bdc}$	Capacitance of bidirectional converter
$C_{eq}$	Equivalent dc bus capacitance
$C$	Capacitance of converter
$D_H$	High duty ratio
$D_L$	Low duty ratio
$d$	Steady state duty cycle of converter
$E$	Input voltage of a converter
$\gamma$	De-normalized parameter of switching function
$i_{bat}$	Battery side current of a BDC
$i_{bdc}$	Current supplied or drawn by a BDC to/from the dc bus
$I_{cell}$	Nominal value of the battery voltage
$I_{c,min}$	Minimum battery charging current
$i_{const}$	Current drawn by a constant current load
$i_{CPL}$	Current drawn by the CPL
$I_{CPL}$	Constant current component of small-signal model of a CPL
$i_{CVL}$	Current drawn by the CVL
$I_{d,max}$	Maximum permissible battery discharging current
$I_d$	Diode saturation current
$i_{Lref,bdc}$	Inductor current reference for BDC
$i_{Lbdc}$	Inductor current of bidirectional converter
$i_{Lref,j}$	Inductor current reference for $j^{th}$ RES converter
$i_{load}$	Load current
$i_{Lref}$	Reference value of inductor current
$i_L$	Inductor current
$I_{max,j}$	Maximum allowable current of $j^{th}$ RES converter
$i_{oj}$	Output current of $j^{th}$ RES converter
$I_{sc}$	Short-circuit current of a PV cell
$\kappa$	Arc constant of the nonlinear adaptive droop
$k$	Boltzmann's constant
$\lambda$	Positive constant
$L_{bdc}$	Inductance of bidirectional converter
$L$	Inductance of converter
$\mu$	Positive constant
$n_{cell}$	Number of cells in a PV module
$P_n$	Net CPL power (resultant of power produced by the RESs and CPL demand)
$P_{RL}$	Power consumed by the resistive load
$P_S$	Total power supplied by RESs operating in MPPT mode
$P$	Rated power of the CPL
$q$	Electron charge

<i>Symbol</i>	<i>Description</i>
$\bar{Q}$	Positive scalar
$Q_d$	Diode quality factor
$Q$	Positive constant
$R_{CPL}$	Negative resistance component of small-signal model of a CPL
$R_d$	Equivalent droop coefficient
$\rho$	Model uncertainty
$r_L$	Equivalent series resistance of the inductor
$R_L$	Resistance of the constant voltage load
$R_p$	Parallel leakage resistance of a PV cell
$R_s$	Series resistance of a PV cell
$\mathbb{R}$	The field of real numbers
$s$	Switching function
$\tau$	Trace of a matrix
$T$	Temperature
$u_{eq}$	Equivalent control
$u_N$	Discontinuous control
$u(t)$	Instantaneous duty cycle of the converter/control input
$V_{bat}$	Nominal voltage of the battery
$v_{bus}$	DC bus voltage
$V_{cell}$	Voltage a PV cell
$v_{CPL}$	Current drawn by the CPL
$v_{Cref}$	Reference value of capacitor voltage
$v_C$	Capacitor voltage
$v_{dc,ref}$	Nominal value of the dc bus voltage
$V_d$	Diode voltage
$V_L$	Minimum acceptable dc bus voltage
$V_{module}$	Voltage of a PV module
$V_{pv}$	Voltage of a PV array
$V_T$	Thermal voltage
$x_{1ref}$	Reference value of state variable $x_1$
$x_1$	Moving average of inductor current, $i_L$
$x_{2ref}$	Reference value of state variable $x_2$
$x_2$	Moving average of capacitor voltage, $v_C$
$\xi$	Arc coefficient of nonlinear adaptive droop
$x_{ref}$	Reference value of normalized inductor current
$x$	Normalized inductor current
$y_{ref}$	Reference value of normalized capacitor voltage
$y$	Normalized capacitor voltage
$Z_0$	Output impedance of feeder subsystem
$Z_{in}$	Input impedance of load subsystem