

Parameters used in the simulation studies

Appendix A: Parameters of Sunpower SPR-305-WHT-U (305W) Solar Panel

Parameters	Values
Open circuit voltage (V_{oc})	64.2V
Voltage at P_{MPPT} (V_{MPPT})	54.7V
Short circuit current (I_{sc})	5.96A
Current at P_{MPPT} (I_{MPPT})	5.58A
No of cells in series	96
The maximum power (P_{max})	305W
Temperature coefficient for I_{sc}	3.5mA/°C

Appendix B: Parameters for BESS model

Parameters	Values
Fully charged voltage E_{full}	239.53V
Exponential voltage E_{exp}	224 V
Exponential capacity	0.66 Ah
Nominal voltage E_{nom}	220 V
Nominal capacity E_{nom}	208.33 Ah
Initial SOC (%)	60%
Battery internal resistance R_b	0.011Ω
Rated capacity	200 Ah

Appendix C: Parameters for PMSG model

Parameters	Values
Rated power	6 kW
Rated torque	40 Nm
Rated speed	153rad/s
Rated current	12A
No. of poles pairs	5
Stator phase resistance, R_s	0.425 Ω
Permanent magnet flux:, Ψ	0.433 Wb
Stator direct inductance, L_{sd}	0.0084 H
Stator quadrature inductance L_{sq}	0.0084 H
Inertia of the whole system:,	0.01197 Kg.m ²
Friction factor, F	0.001189 N.m

Appendix D: Parameters of Wind turbine

Parameters	Values
Density of air	1.225 Kg/m ³
Area swept by blades, A	1.06 m ²
Optimum coefficient,	$1.67 \times 10^{-3} \text{Nm}/(\text{rad/s})^2$
Base wind speed	12m/s
The coefficients	$c_1=0.5176$ $c_2=116$
c_1 to c_6	$c_3=0.4, c_5=21, c_6=0.006$

Appendix E: Specification simulation parameters of the grid side converter

Parameters	Values
DC-Link voltage (V_{dc})	660V
Capacitance of the dc link (C_{dc})	6000 μ F
Grid operating voltage	220V
Grid frequency (f)	50Hz
Filter inductance (L)	6 mH
Filter resistance (R)	0.01 Ω
Sample Time (T_s)	50 μ s