

Ex. No:1 Simulation on modelling of Solar PV System- V I Characteristics

Date:

AIM: To study the Simulation on modelling of Solar PV System - V I Characteristics using MATLAB Simulink software.

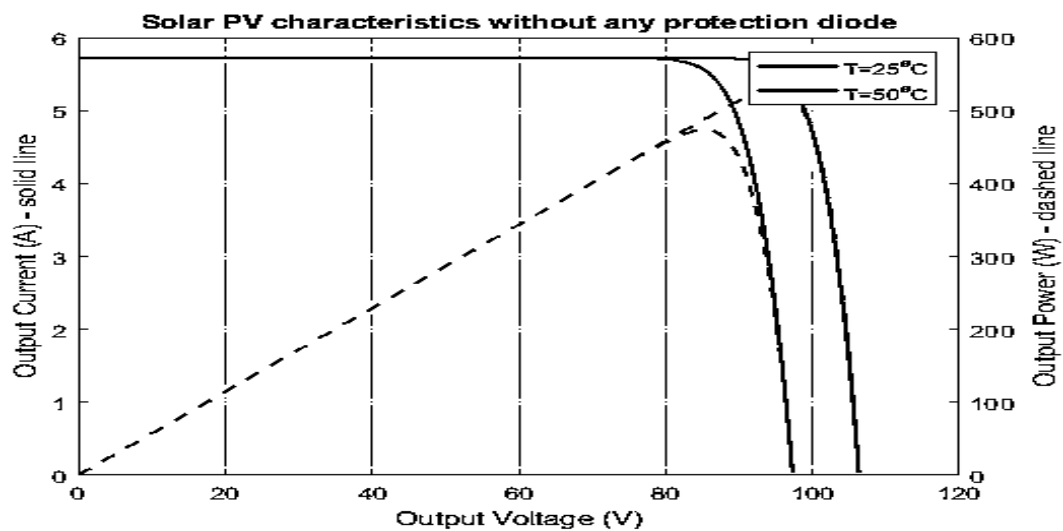
APPARATUS REQUIRED:

- Simulation software (MATLAB Simulink)

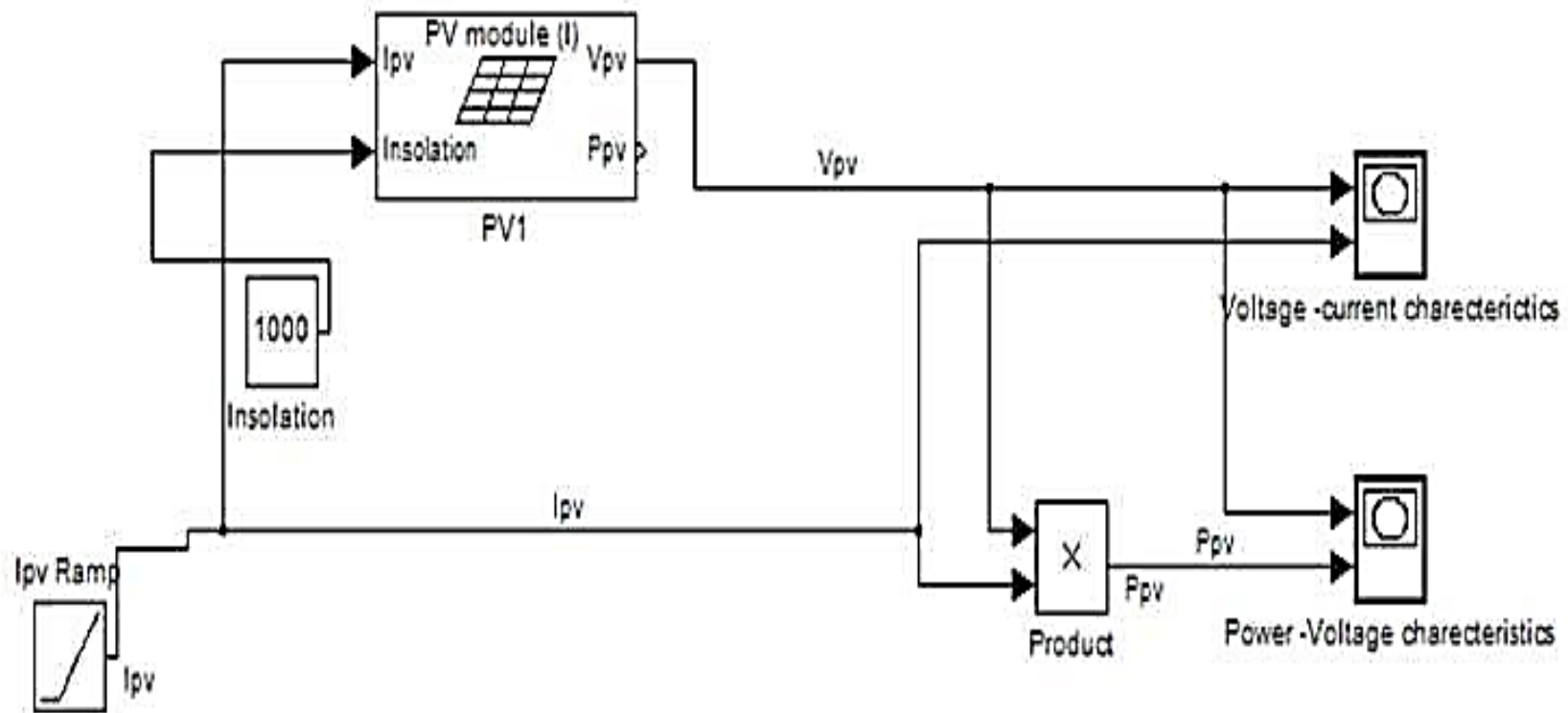
PROCEDURE:

1. MATLAB Simulink model file is created.
2. Using Simulink library PV model generated.
3. Scope is verified for different values of V&I values.

V I Characteristics

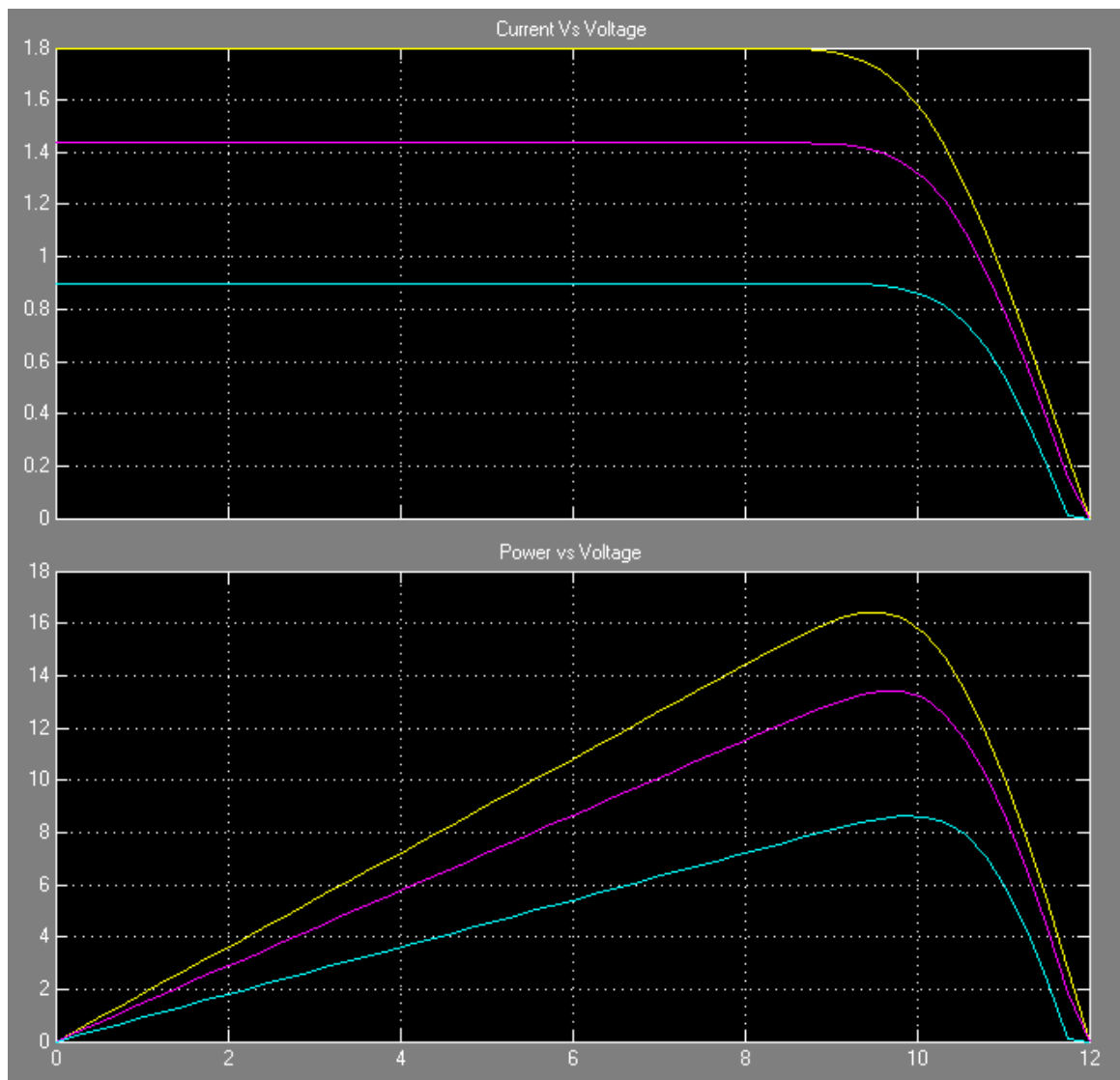


SIMULATION DIAGRAM:



MATLAB Model for Single PV Module

OUTPUT:



RESULT:

Ex.No:2 Simulation on Modelling of fuel cell- V I Characteristics
Date:

AIM: To study the Simulation on modelling of fuel cell- IV Characteristics using MATLAB Simulink software.

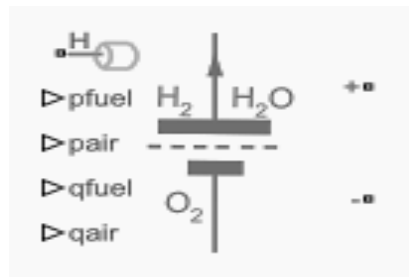
APPARATUS REQUIRED:

- Simulation software (MATLAB Simulink)

PROCEDURE:

1. MATLAB Simulink model file is created.
2. Using Simulink library fuel cell model generated.
3. Scope is verified for different values of I&V values and total stack power.

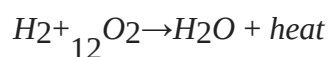
Fuel Cell:



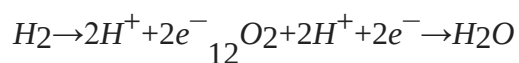
Description

The fuel cell block models a fuel cell that converts the chemical energy of hydrogen into electrical energy.

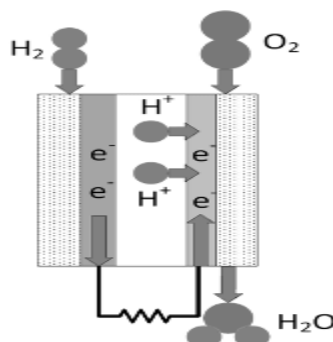
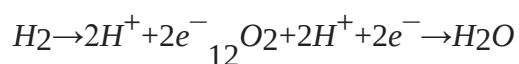
This chemical reaction defines the electrical conversion:



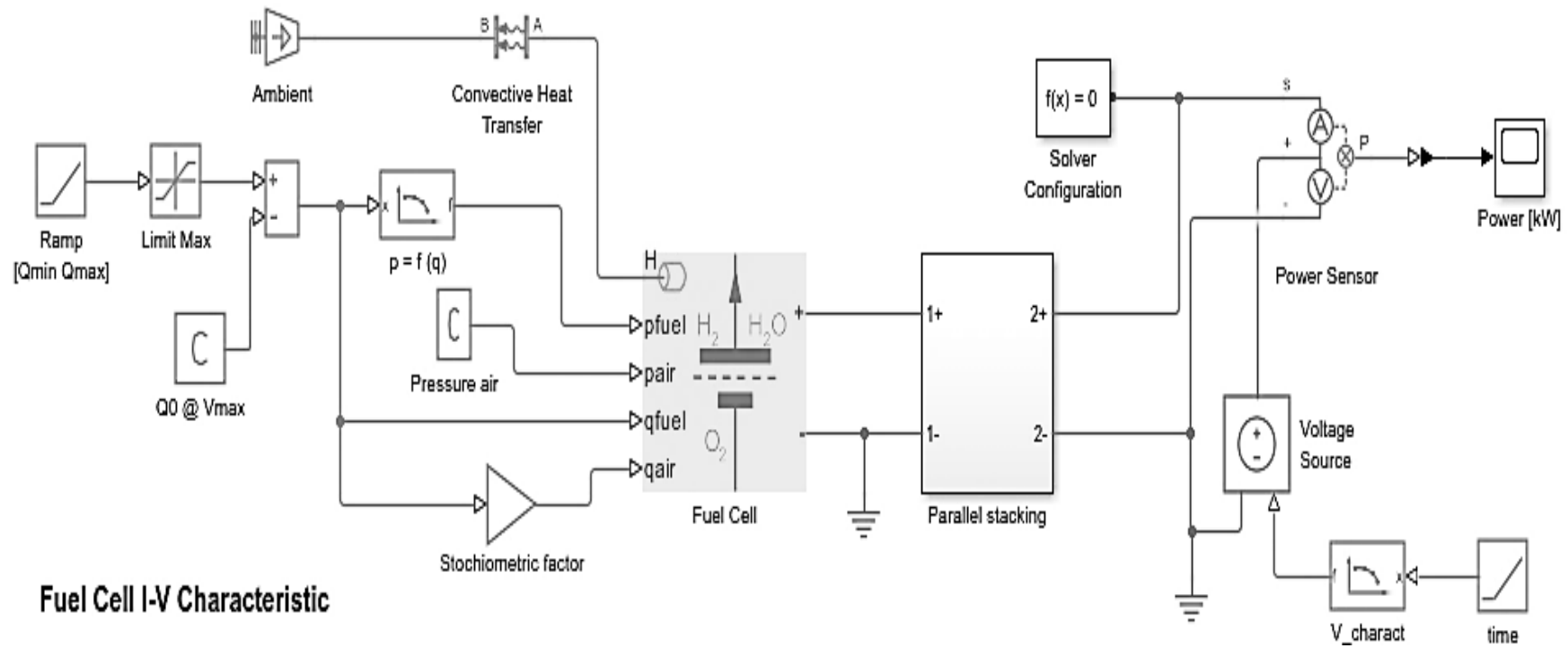
which occurs due to these anode and cathode half-reactions:



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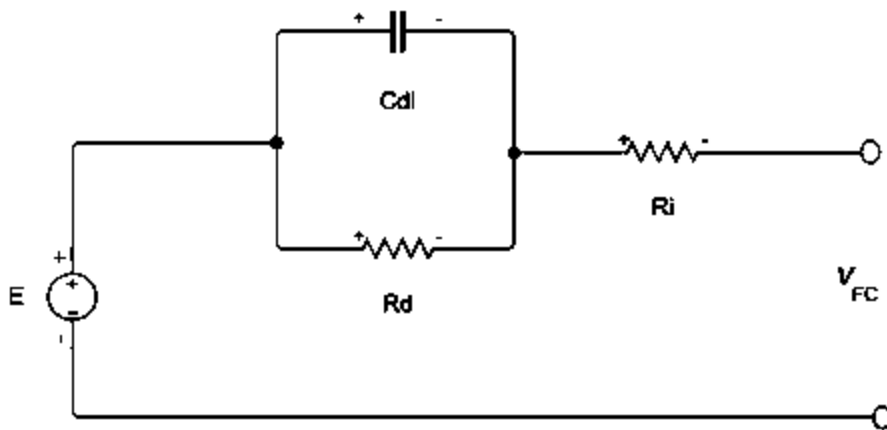


SIMULATION DIAGRAM:



Fuel Cell I-V Characteristic

Equivalent circuit of a single fuel cell:

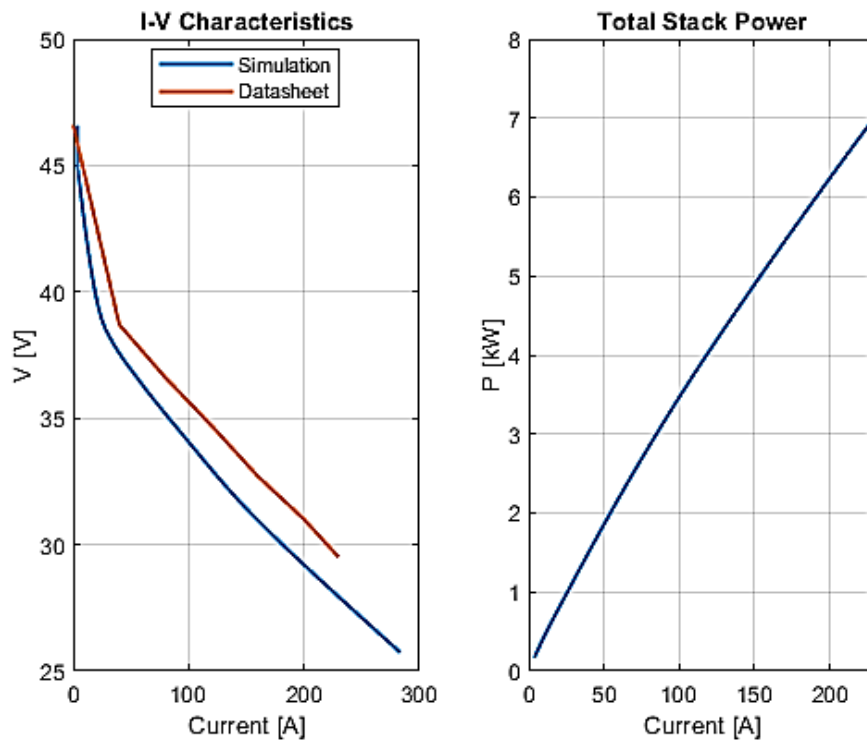


Where:

- V_{FC} is the cell voltage.
- R_i is the Internal resistance.
- R_d is the Sum of activation and concentration resistances.
- C_{dl} is the parallel RC capacitance that accounts for time dynamics in the cell.

I-V Characteristic

The plot below shows the simulated I-V characteristic for the fuel cell, the total stack power.



RESULT:

Ex. No: 3 Simulation of self- excited Induction Generator

Date:

AIM: To study the Simulation on modelling of self- excited Induction Generator (SEIG) using MATLAB Simulink software.

APPARATUS REQUIRED:

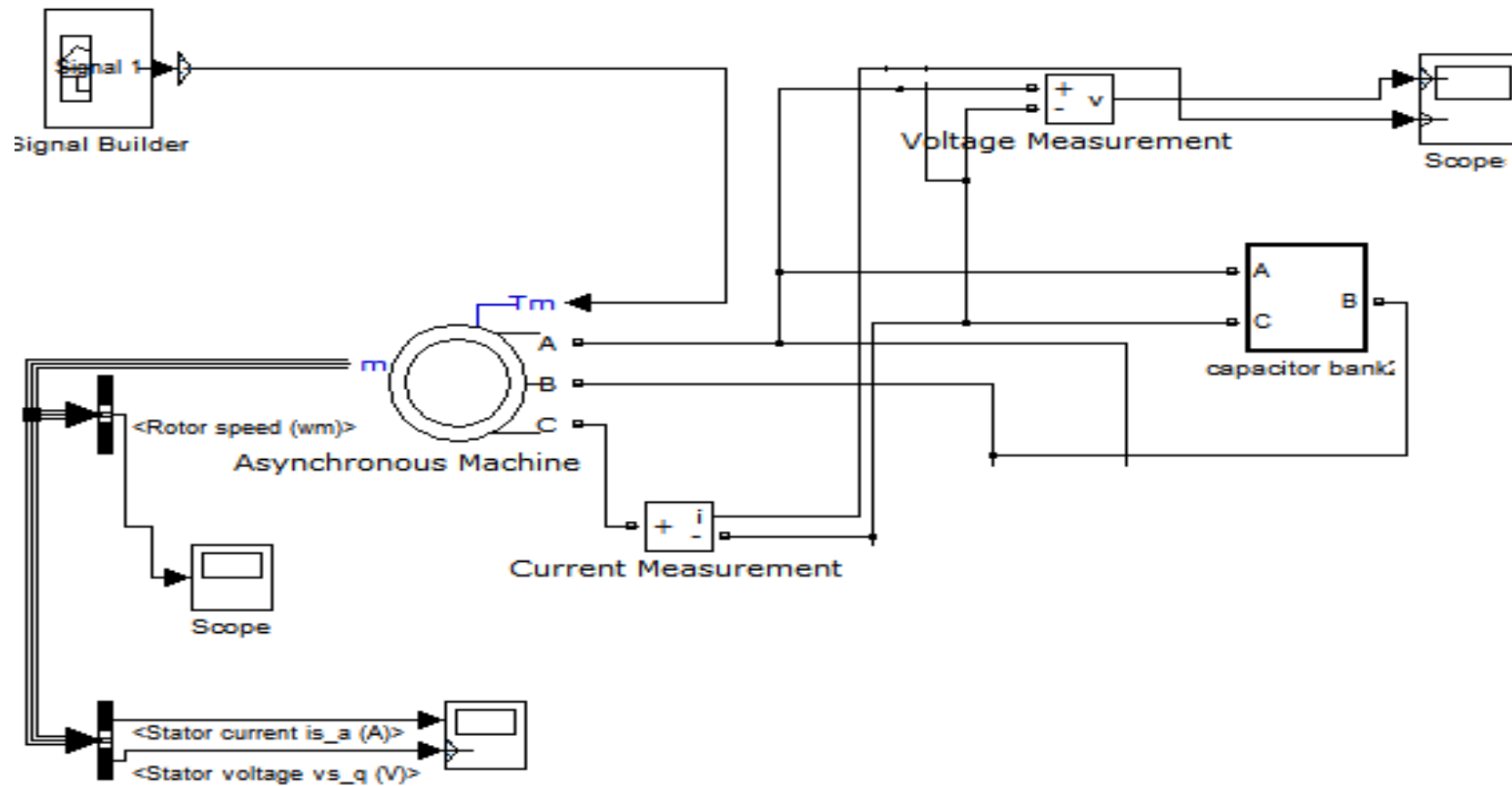
- Simulation software (MATLAB Simulink)

PROCEDURE:

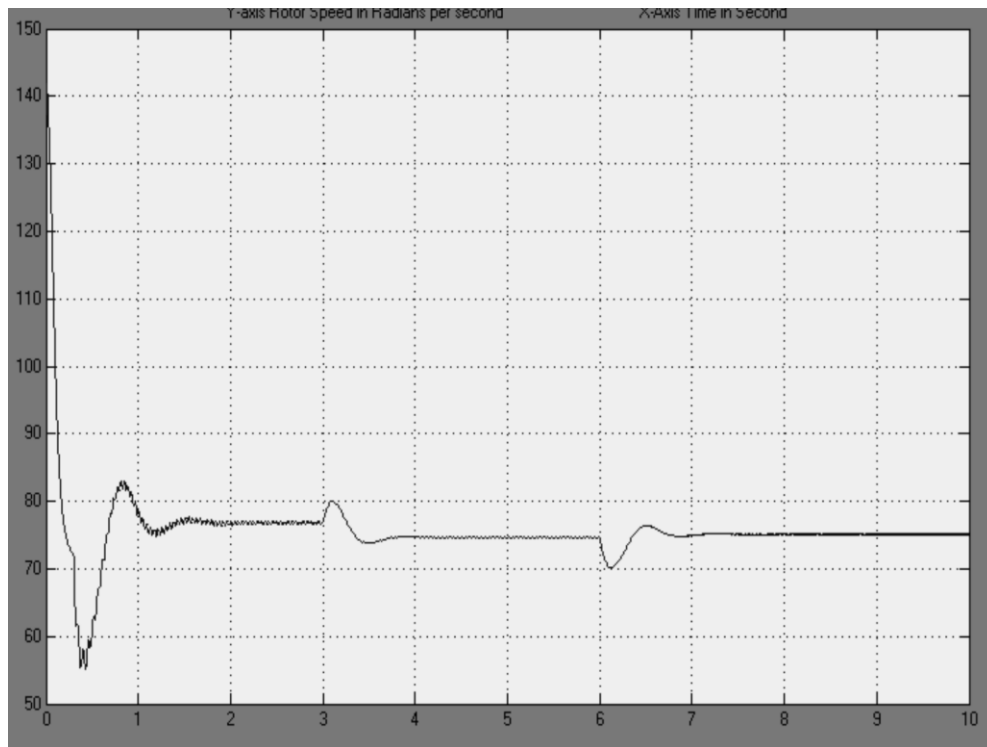
1. MATLAB Simulink model file is created.
2. Using Simulink library self- excited Induction Generator (SEIG) generated.
3. Scope is verified the Rotor Speed.

Parameters	Value
Power	4 kW
Voltage	400 V l-l
Frequency	50 Hz
Stator- Resistance	1.40 Ω
Stator- Inductance	5 mH
Stator- Resistance	1.39 Ω
Stator- Inductance	5 mH
Mutual Inductance	172 mH
J (Moment of Inertia)	0.0131 kgm ²

SIMULATION DIAGRAM:



MATLAB/SIMULINK model of Self Excited Induction Generator (SEIG)



Rotor Speed in Radians per Second

RESULT:

Ex. No:4 Simulation of DFIG/ PMSG based Wind turbine.
Date:

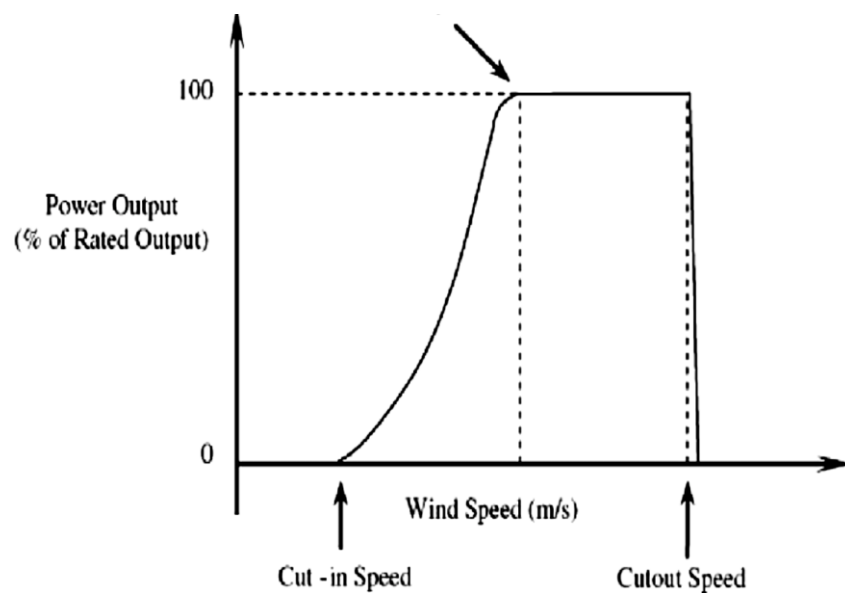
AIM: To study the Simulation on modelling of PMSG based Wind turbine using MATLAB Simulink software.

APPARATUS REQUIRED:

- Simulation software (MATLAB Simulink)

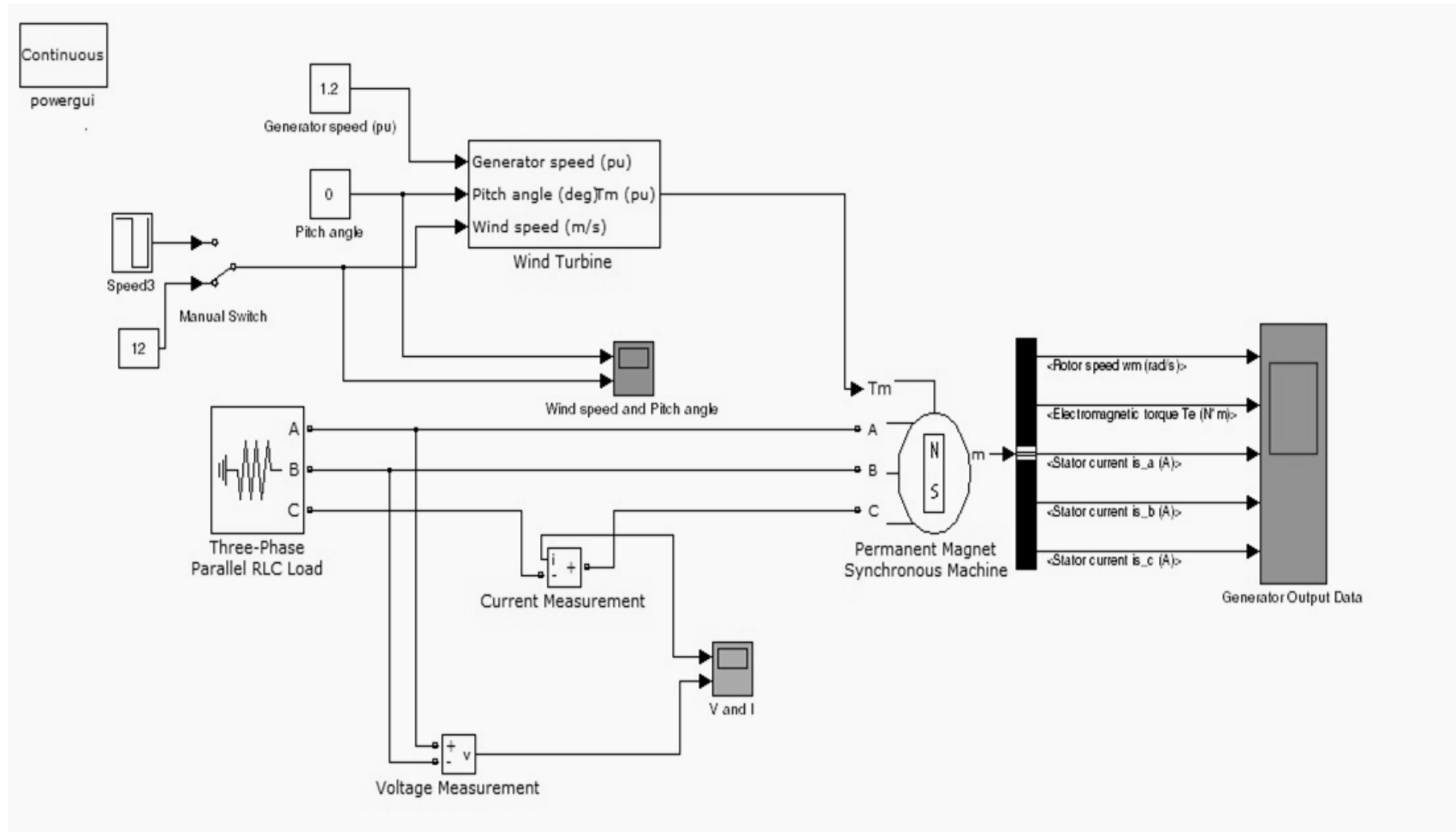
PROCEDURE:

1. MATLAB Simulink model file is created.
2. Using Simulink library PMSG based Wind turbine model generated.
3. Scope is verified for Simulated Wind Speed.

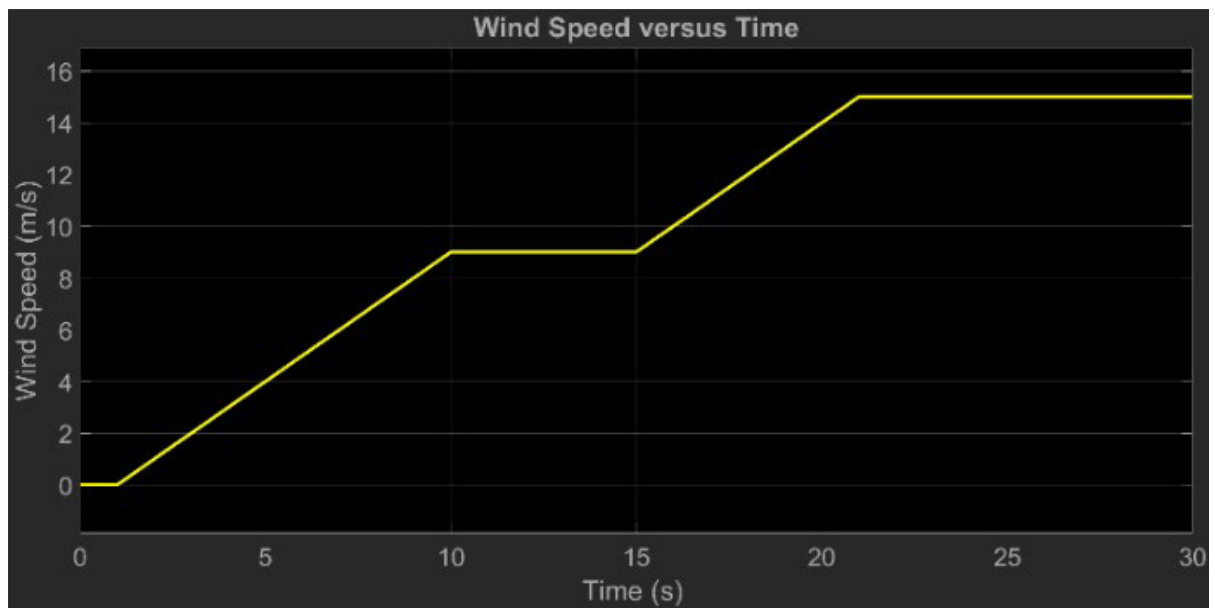


Wind Turbine Power Curve

SIMULATION DIAGRAM:



MATLAB Simulink model of PMSG based Wind turbine



Simulated Wind Speed

RESULT:

Ex.No:5 Simulation on Grid integration of RES.

Date:

AIM: To study the Simulation on modelling on Grid integration of Renewable Energy System (RES) using MATLAB.

APPARATUS REQUIRED:

- Simulation software (MATLAB Simulink)

PROCEDURE:

1. MATLAB Simulink model file is created.
2. Using Simulink library Grid integration of Renewable Energy System.
3. Scope is verified for different values of I&V values P-V Characteristics.

PV Array

The PV array consists of 86 parallel strings. Each string has 7 Sun Power SPR-415E modules connected in series.

Three-phase DC/AC Converter

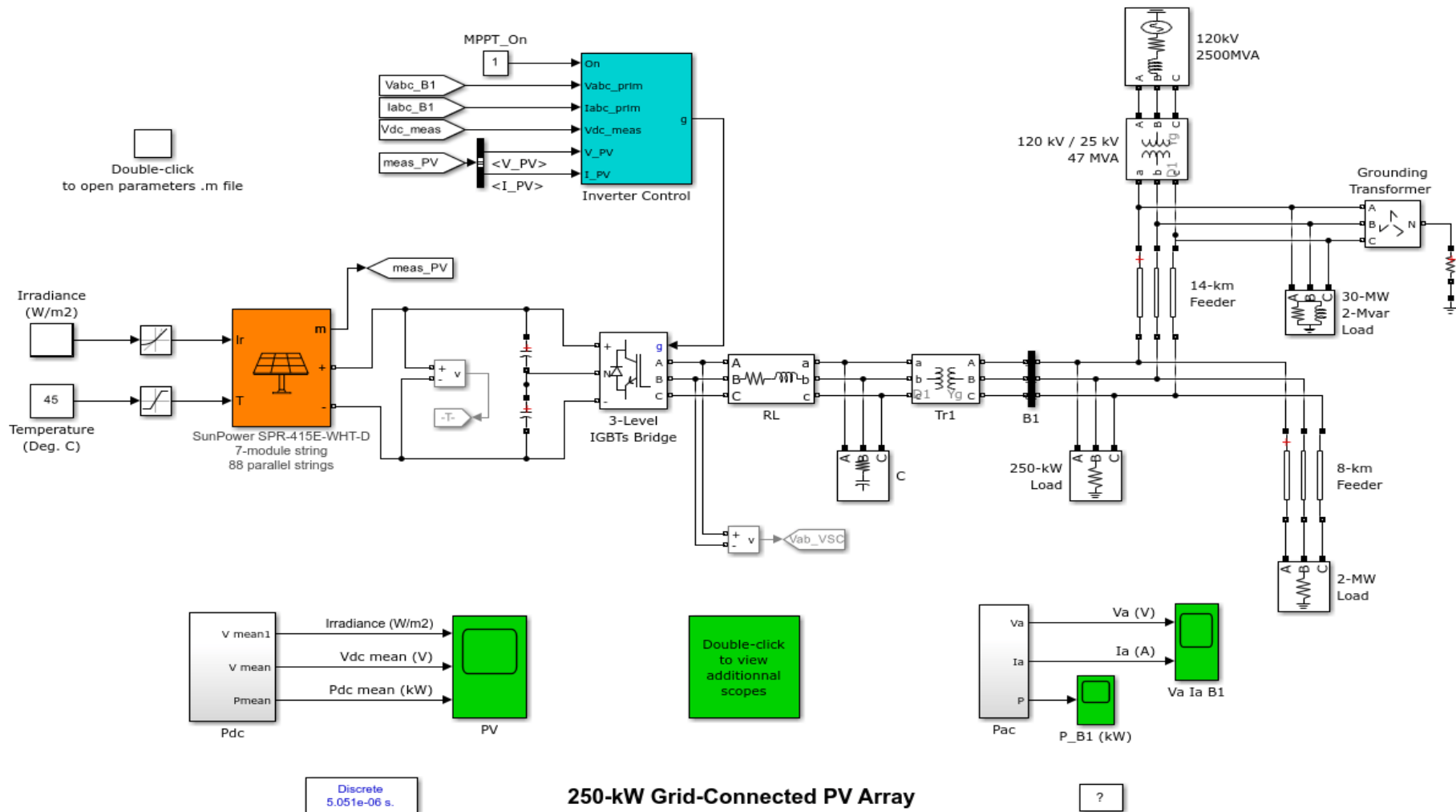
The converter is model using a 3-level IGBT bridge PWM-controlled. The inverter choke RL and a small harmonics filter C are used to filter the harmonics generated by the IGBT bridge. A 250-kVA 250V/25kV three-phase transformer is used to connect the inverter to the utility distribution system.

Utility Grid

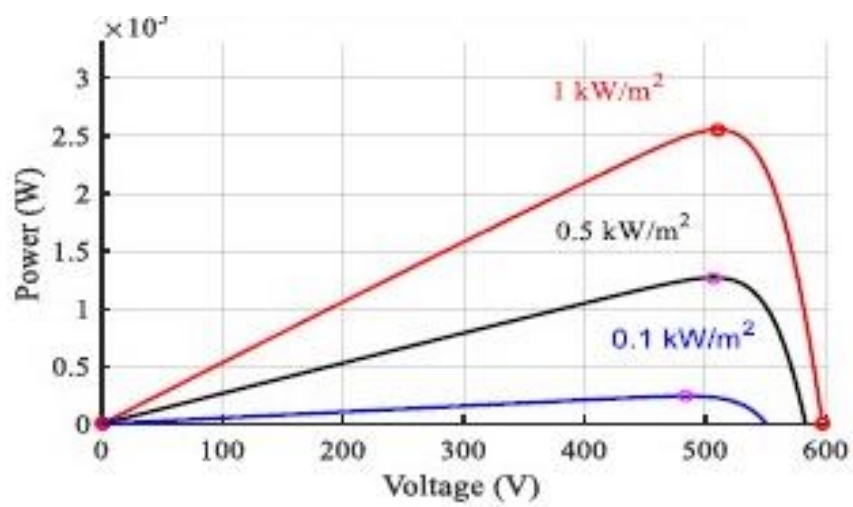
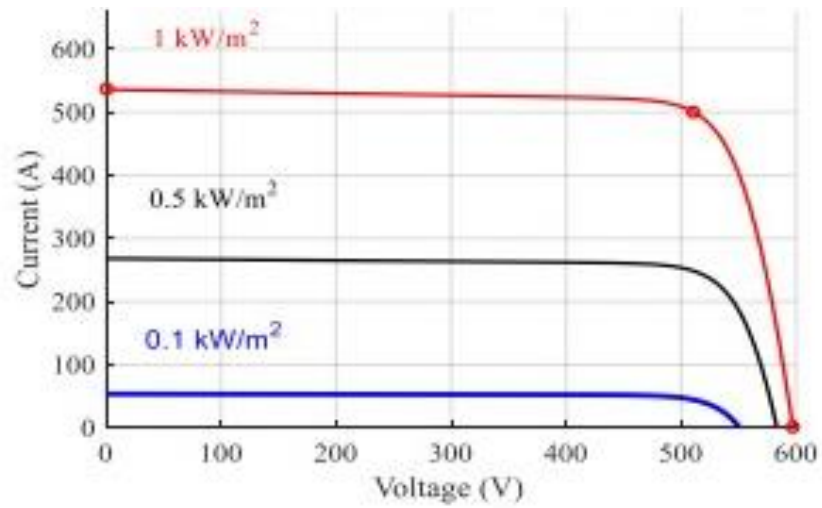
The grid is model as a distribution grid. It included two 25-kV feeders, loads, grounding transformer and an equivalent 120-kV transmission system.

250-kW Grid-Connected PV Array

Model of a 250-kW PV array connected to a 25-kV grid via a three-phase converter.



I&V and P-V Characteristics



RESULT: