

bus interface power converter. The DC Micro grid block diagram considered for the analysis is shown in Fig.1.

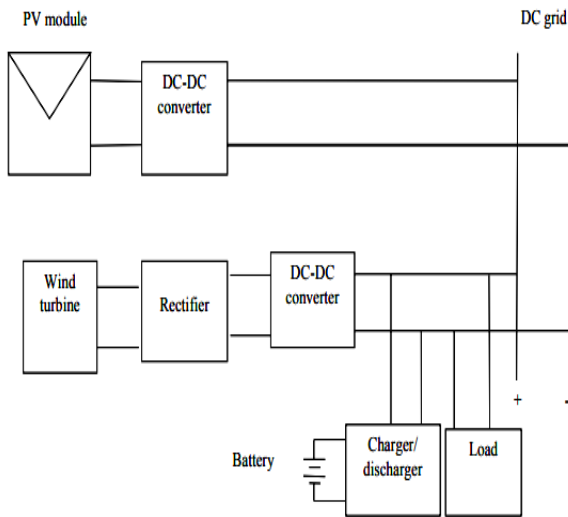


Fig. 1 Block diagram of the DC micro grid with Solar and wind energy sources

The wind turbine power is generated by the induction generator. The power generated from the induction generator is rectified to DC and through a power converter, fed into the DC bus. The MOSFET is used for the purpose of switching. The output is connected to the DC micro grid from the DC-DC boost converter where the loads are connected. The battery work is carried out by a DC-DC boost converter that also regulates the voltage of the DC connection.

2.1 Distributed generator:

2.1.1 Model of Wind and Solar System

As distributed generators, a solar system and a wind system are introduced. The solar system is created by a boost converter connected to photovoltaic arrays. The radiance profile, G , is taken as the input to emulate the PV system, and the output power is calculated to be processed by the converter control in which the wind speed, V_w , is the input of the wind system. The created AC power is converted to DC by a rectifier, so the same control process applied to the PV system is applied to the wind structure. The output power is processed via the control of the converter.

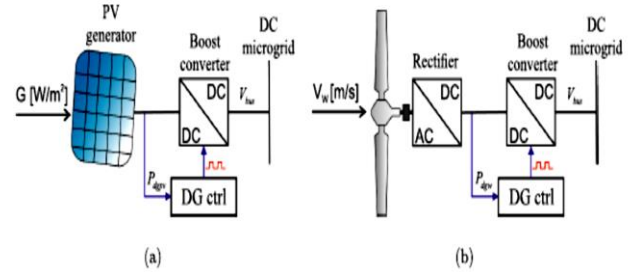


Fig 2. Distributed generation system (a) PV solar system. (b) Wind system

3. MPPT (Maximum power point Tracking) :

The Maximum Power Point Tracker (or MPPT) is a high-efficiency DC to DC converter that provides a solar panel or array with an ideal electrical load and generates a load-appropriate voltage. For a full array, conventional solar inverters perform MPPT. The same current, determined by the inverter, flows through all panels in the chain in such systems. But since different panels have distinct IV curves, i.e., different MPPs (due to production tolerance, partial shading, etc.), this architecture ensures that certain panels can perform below their MPP, resulting in energy loss. In the DC side, continuous power is avoided assistance in power flow algorithm management the battery regulates the DC link voltage. Hence maximum power is extracted from solar and wind energy systems.

3.1 INCREMENTAL CONDUCTANCE METHOD:

This approach consists of using the slope of the current derivative relative to the voltage to achieve the maximum power point. In the real world, what value MPPT offers depends on the collection, its environment, and its seasonal load pattern. Only when the V_{pp} is more than about 1V higher than the battery voltage does it give us an important current boost. This might not be the case in hot weather unless the batteries have a low charge. The V_{pp} will increase to 18V in cold weather, however. If the use of energy is highest in the winter (typical in most homes) and the winter weather is cold, when it is most needed, the energy will increase considerably.

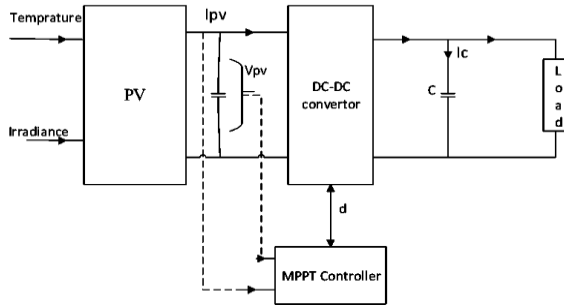


Fig.3: PV System with Power Converter and MPPT Control

Where, $P = V \times I$

$$\begin{cases} \frac{\Delta I}{\Delta V} = -\frac{I}{V} & \text{at the MPP} \\ \frac{\Delta I}{\Delta V} > -\frac{I}{V} & \text{left of the MPP} \\ \frac{\Delta I}{\Delta V} < -\frac{I}{V} & \text{right of the MPP} \end{cases}$$

MPP can be monitored by comparing instant conductance with incremental conductance.

4. RESULTS AND DISCUSSION:

The DC Micro grid consists of a wind generator with 700 W PV array and 500 W. A boost converter links the PV array to the 48V DC bus. A rectifier attaches the induction generator to the DC bus. The MPPT algorithm is used by Incremental Inductance. A 24V battery connects to the DC connection through a charger/discharger circuit. The charger circuit regulates the DC link voltage.

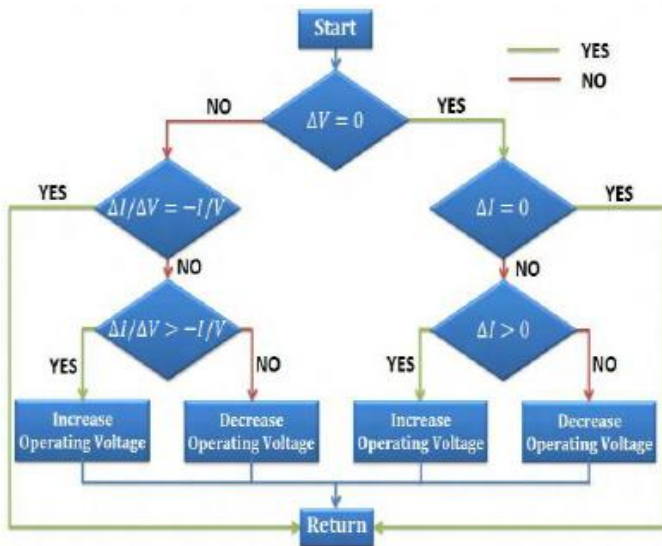


Fig 4: Organigram of incremental Inductance algorithm

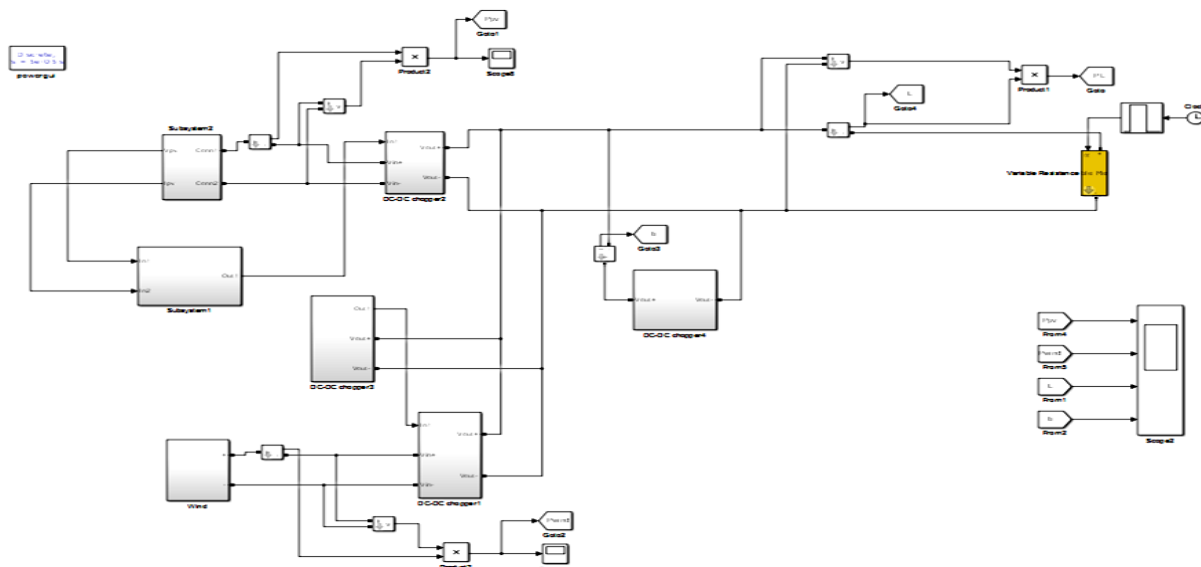
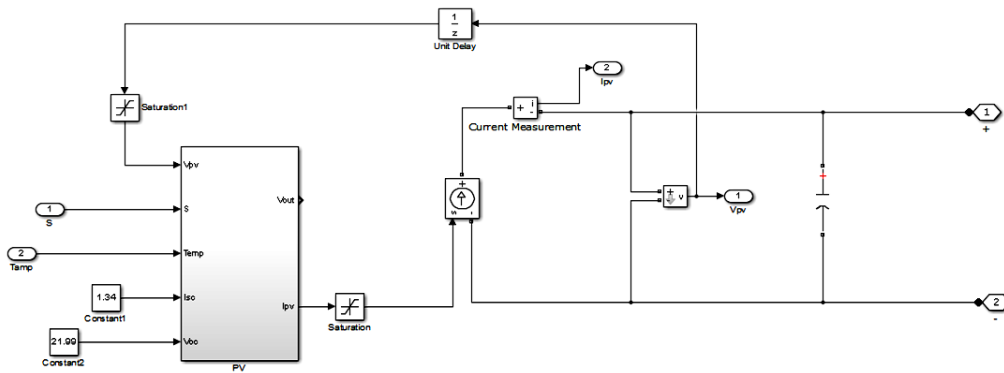
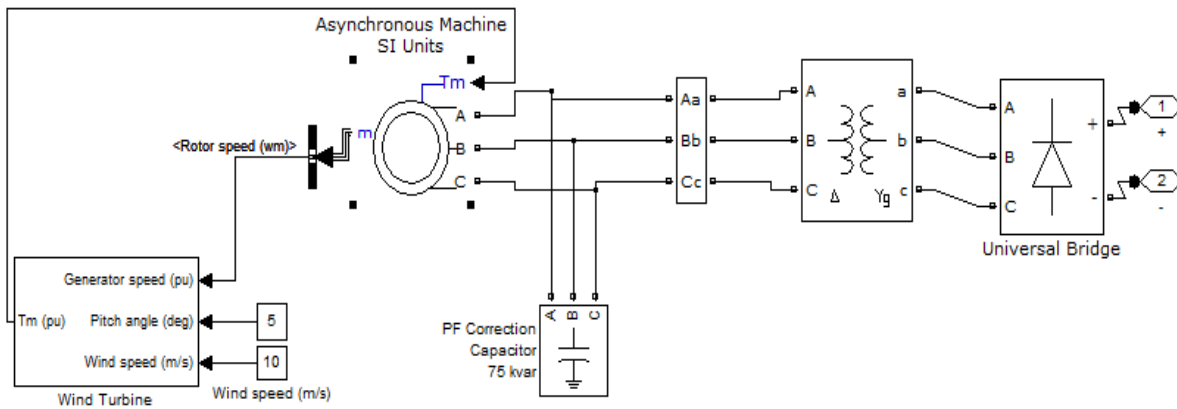


Fig 5 Simulink model of the developed DC Micro grid

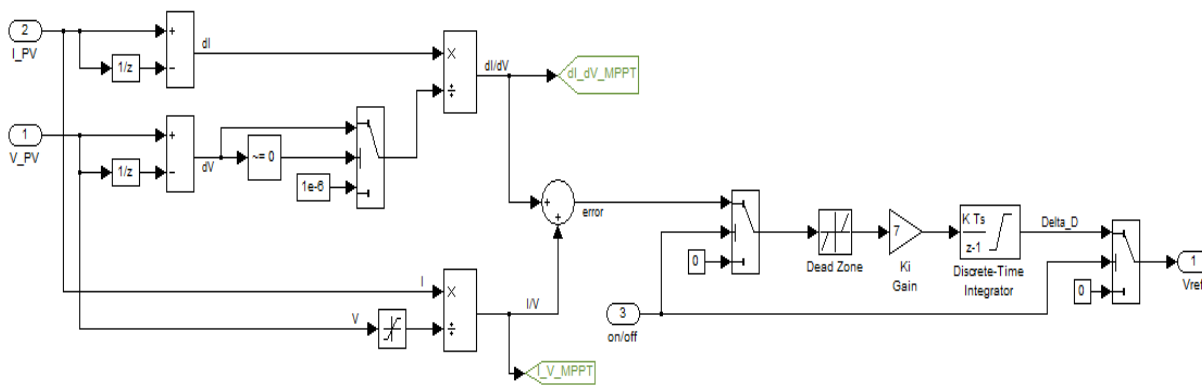
SOLAR POWER GENERATION:



WIND POWER GENERATION:



MPPT-INCREMENTAL CONDUCTANCE:



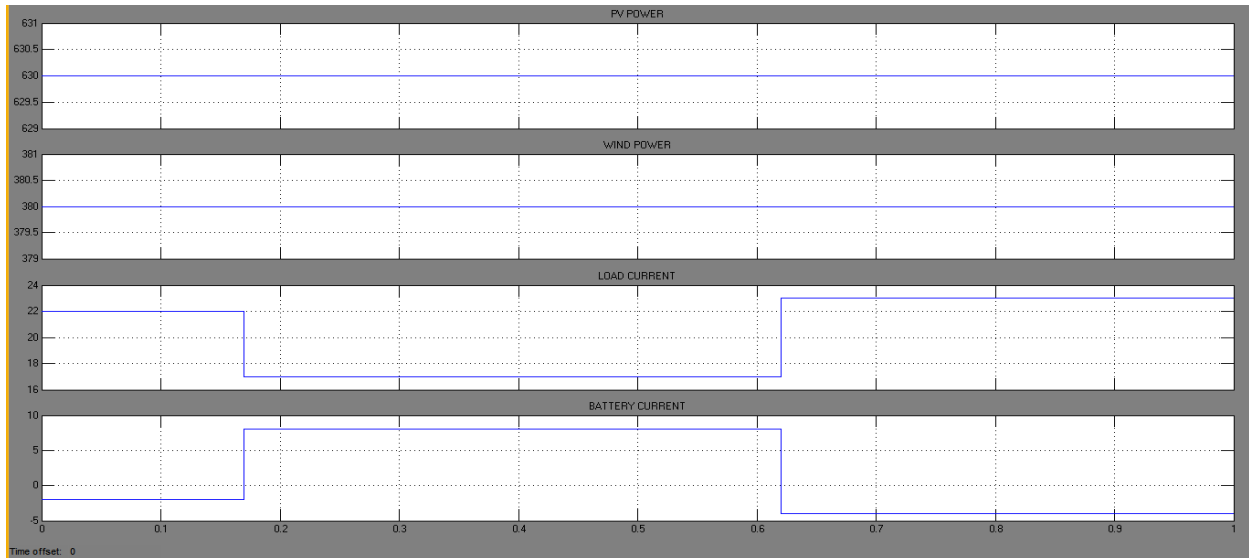


Fig 6: Response of the system for increase & decrease in load power

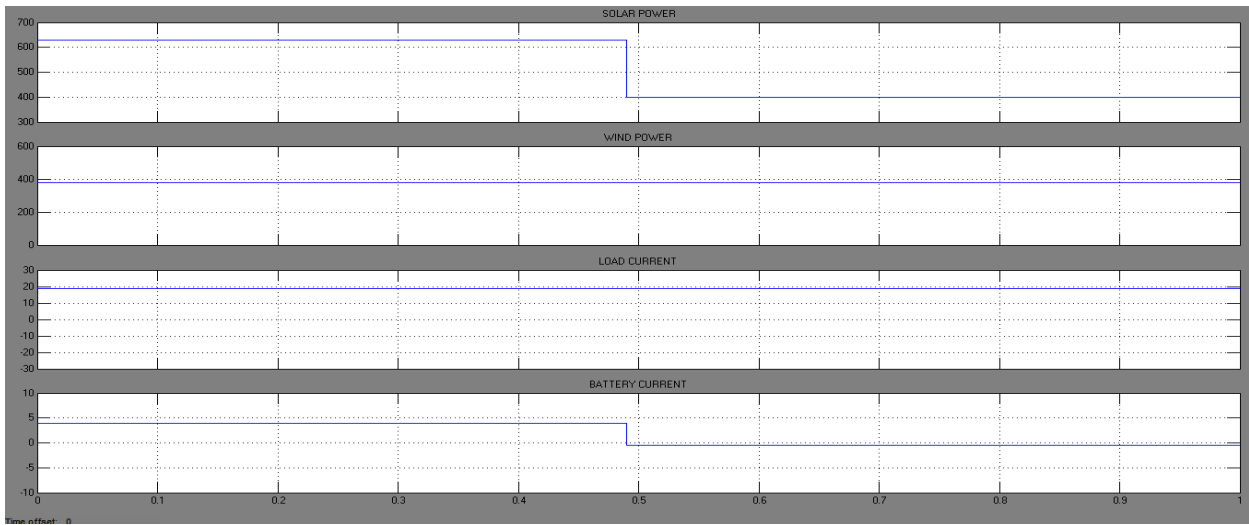


Fig 7: Response of the system during change in Ppv

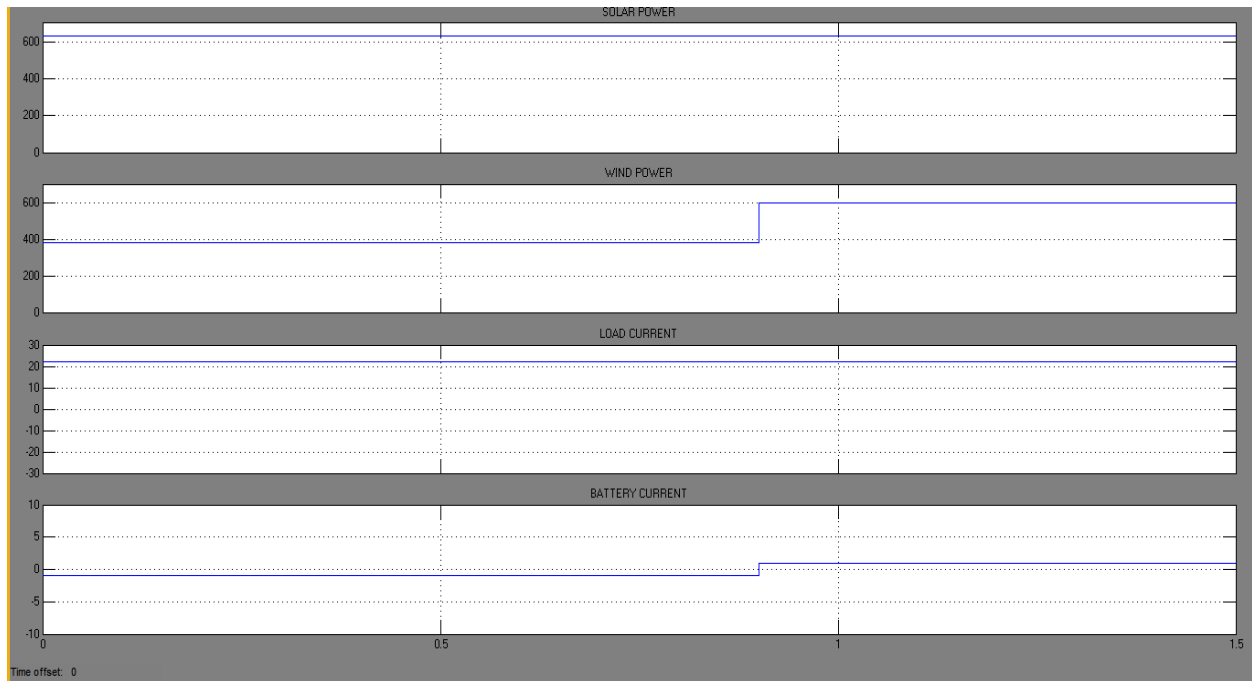


Fig 8: Response of the system during change in Pw

A. Change in load power:

The power from the solar panel (PPV) supplies 630W and the power (PW) from the wind turbine provides about 380W. If the load current (IL) decreases, i.e. the load demand decreases, then the excess energy is used to charge the battery in charging mode. The power from the solar panel (PPV) supplies 630W power and the power (PW) from the wind turbine provides about 380W., when the load current (IL) rises, i.e. the demand for load increases, the battery operates in discharge mode to supply the deficit power.

B. Change in PV power:

The power generated from the solar panel (PPV) is reduced from 630W to 415W and the wind turbine produces the same power of 380W to research the response of the system to changes in input power. The battery works in the discharging mode to provide uninterrupted power to the load.

C. Change in Wind power

As the wind turbine (PW) generated power raises from 380W to 590W and the solar panel generates 630W of the same power, the additional power generated is used to charge the battery.

Conclusion:

For power flow management and incremental conductance, a maximum power point monitoring algorithm control algorithm for the DC micro grid with solar and wind power sources is presented. In this study, an incremental conductance maximum power point monitoring algorithm control is suggested to increase the inertia of the dc micro grid and decrease the change rate of the dc voltage. As the scheme involves different intermittent energy sources and loads that can vary in demand for power flow management and incremental conductance, a maximum power point monitoring control algorithm for the DC micro grid must be developed. To provide the loads with unceasing power supply and balance the power flow between the different sources at any time, a power flow algorithm management and incremental conductance maximum power point monitoring control algorithm for the DC micro grid is developed.

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BIOGRAPHIES



K.Ramesh completed his PG from SRIT, ATP, areas of interest are electric vehicles, power systems. Working as an assistant professor in SVIT Engineering college Anantapur



M. Mounika completed her PG from JNTUP, pulivendula, areas of interest are electric vehicles, power systems. Working as an assistant professor in SVIT Engineering college Anantapur.