JES Journal of Engineering Sciences

Vol 11, Issue 7,July/2020

ISSN NO:0377-9254

Performance of DC Grid Based Wind Power Generation System in a Micro-grid

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***Abstract*—These works present a structure of DC system base wind power generating system. The proposed of a system is permits adaptable activity of different equal associated wind generators by taking out the requirement for voltage and frequency synchronization. The model prescient control calculation that offers enhanced transient reaction as for the adjustments in the working conditions is proposed for the control of the inverters. The structure idea is checked through different test situations to exhibit the operational capacity of the proposed micro-grid when it works associated with and islanded from the distribution grid, and the results acquire are examined**

***Keywords*—Wind energy, PI Controller, DC/AC.**

1. INTRODUCTION

Wind turbines to diminish the homesteads' interest on the lattice. The Malaysia government is effectively advancing this new idea of collecting wind type energy from electric airing fans in poultry ranches which has been executed in numerous nations around the globe [4]. The significant contrast between the circumstance in poultry ranches and normal wind ranches is wind speed inconstancy. The conversion ability of wind speed in wind cultivates legitimately relies upon the natural and climate circumstances though awind speed in fowl ranches is commonly steady all things considered created by steady speed ventilation fans. In this way, the generation irregularity gives that influence the unwavering quality of power gracefully and power base balance is not predominant in farm ranch wind base energy systems. As of late, the exploration consideration on dc matrices has been resurging because of mechanical progressions in power hardware and energy base storagedevices, and increment in the assortment of dc type loads and the infiltration of dc Distributed energy-resources (DER,) for example, sunlight based photo-voltaic and energy units. Many examination takes a shot at dc micro-grids have been directed to encourage the reconciliation of different DERs and energy storagesystems.

In [5], [6], a dc micro-grid type based wind ranch design in which each of a wind energy transformation unit comprising of a system converter, at high level frequency transformer and a solitary phase ac/dc converter is proposed. Be that as it may, the proposed design expands the system unpredictability as three phases of conversion are essential. In [7], a dc type micro-grid based on wind ranch design in which WTs are bunched into gatherings of four with each gathering associated with a converter is proposed. In any case, with the proposed design, the disappointment of one converter will result in each of the four WTs of a similar gathering to be unavailable.

2. Introduction to Wind Energy

Low voltage DC small scale lattices have been generally utilized for providing basic burdens, for example, server farms and remote correspondence stations. Therefore, it is imperative to guarantee excess and enough energy limit so as to help potential additions in load utilization. This is accomplished by methods for development of the energy storagesystem by including extra distribute.Remaining on head of the structure, he can feel the extraordinary speed up contrasted with being on the ground. Wind power stations are regularly found in a similar spot as huge radio broadcast reception apparatuses. Similarly as the high rise encourages the radio signs to travel farther, the expansion heigh above ocean level speeds up and causes the station to create more power.

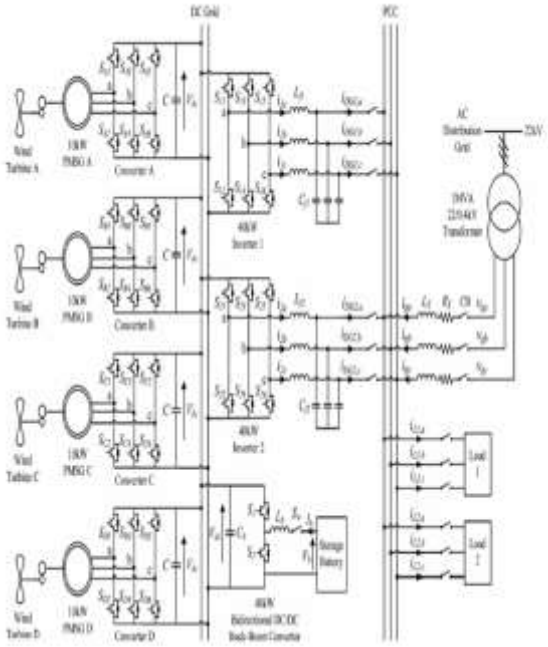


Fig.1 : Block Diagram of Wind System

3. Sinusoidal Pulse Width Modulation

The Sinusoidal Pulse Width Modulation (SPWM) is a notable wave forming strategy in power devices for acknowledgment, a high frequency triangular bearer signal, V1, is contrasted and a sinusoidal reference signal, V, of the ideal frequency. The hybrid focuses are utilized to decide the exchanging moments. The extent proportion of the reference signal (Vr,) to that of triangular sign (Vc) is known as the balance record. The magnitude of fundamental component of output voltage is proportional to modulation index (MI).The amplitude Vr, of the. Triangular signal is generally kept constant. By varying the modulation index output voltage is controlled.

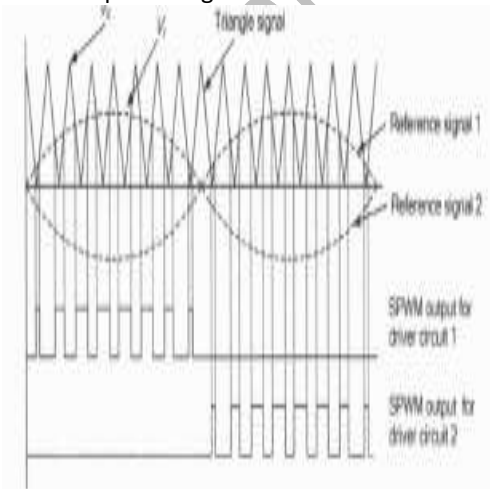
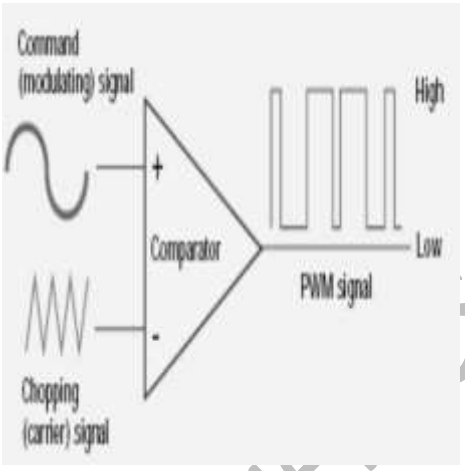
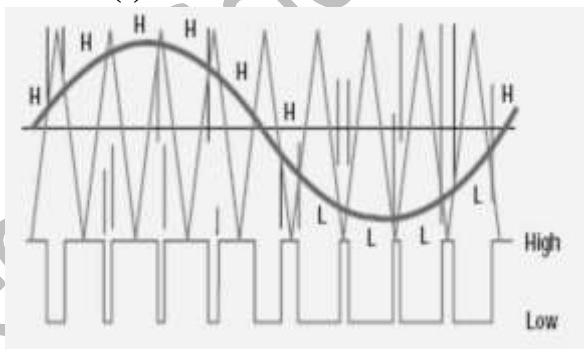


Fig.2: Signals of PWM

The pulse width modulation technique is applied to control the output voltage of the inverter which is also known as variable duty cycle regulation.



(a)



(b)

Fig.4.: Generation of Signals in PWM

The greatness of crucial segment of output voltage is relative to MI.The adequacy Vr, of the. Triangular sign is commonly kept steady. By fluctuating the adjustment file output voltage is controlled. The pulse width balance procedure is applied to control the output voltage of the inverter which is otherwise called variable obligation cycle guideline. Generation of the ideal output voltage is accomplished by looking at the ideal reference waveform (adjusting signal) with a high-frequency triangular 'bearer' wave as delineated schematically. Contingent upon whether the sign voltage is bigger or littler than the transporter waveform, either the positive or negative dc transport voltage is applied at the output. Note that over the time of one triangle wave, the normal voltage applied to the heap is relative to the sufficiency of the sign (accepted steady) during this period. The subsequent cleaved square waveform contains a copy of the ideal waveform in its low frequency segments, with the higher frequency segments being at frequencies of a near the bearer

frequency. Notice that the root mean square estimation of the air conditioner voltage waveform is as yet equivalent to the dc transport voltage, and consequently the absolute consonant mutilation isn't influenced by the PWM procedure.

Simulation work

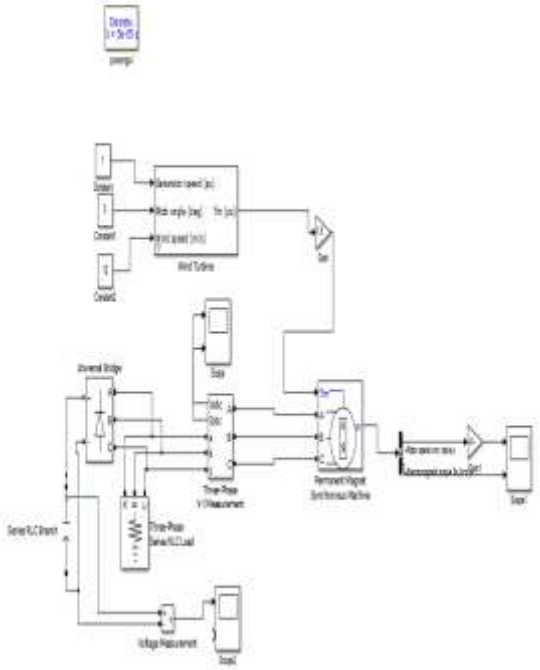


Fig.5 : Simulink design of wind turbine ac to dc converter

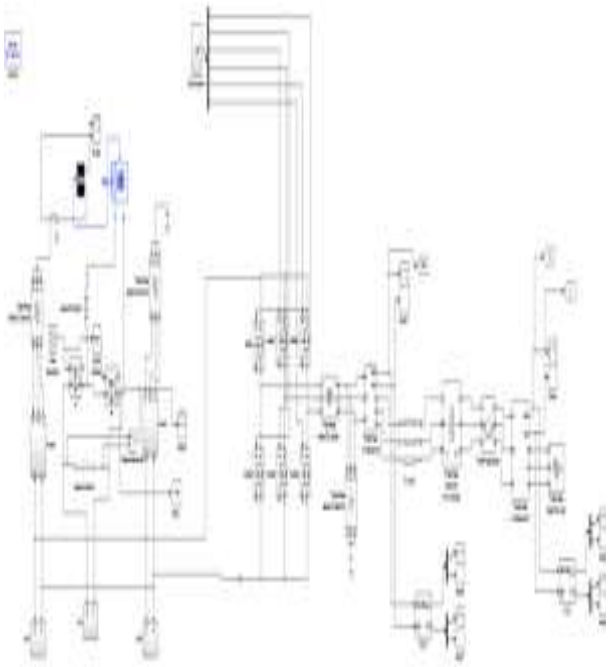


Fig.6: simulink diagram of wind based microgrid.

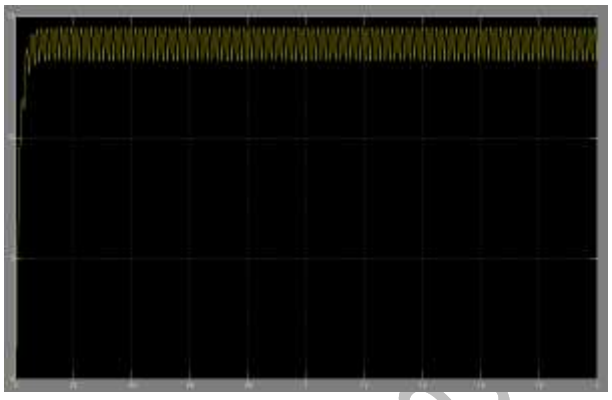


Fig.7: Controlled VSI output voltage

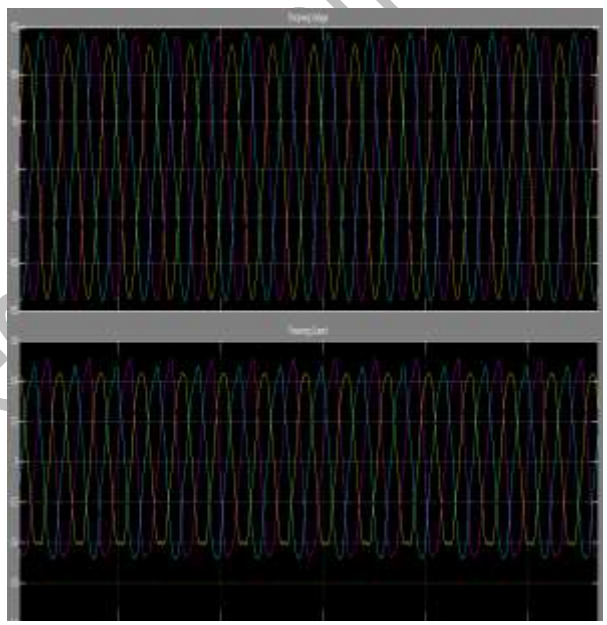


Fig.8: Controlled VSI output Current

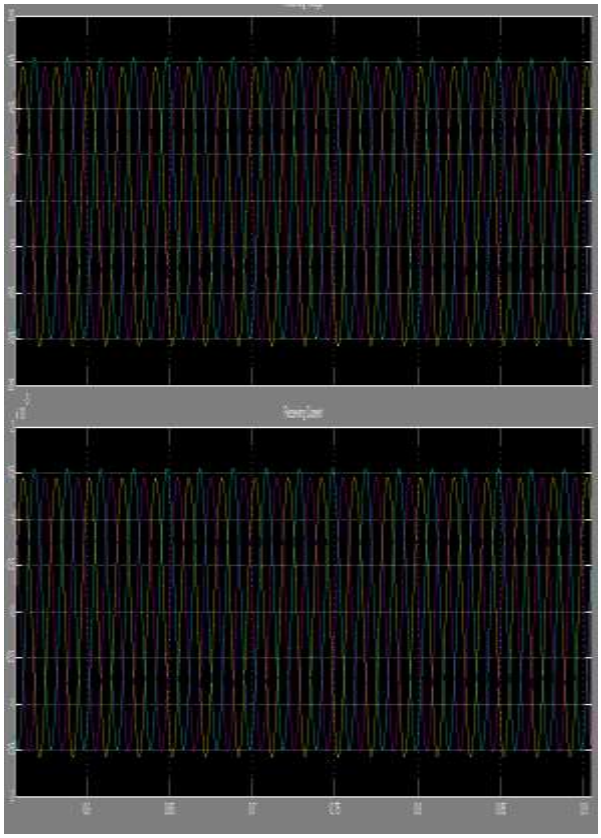


Fig.8 :Load side A) voltage b) current

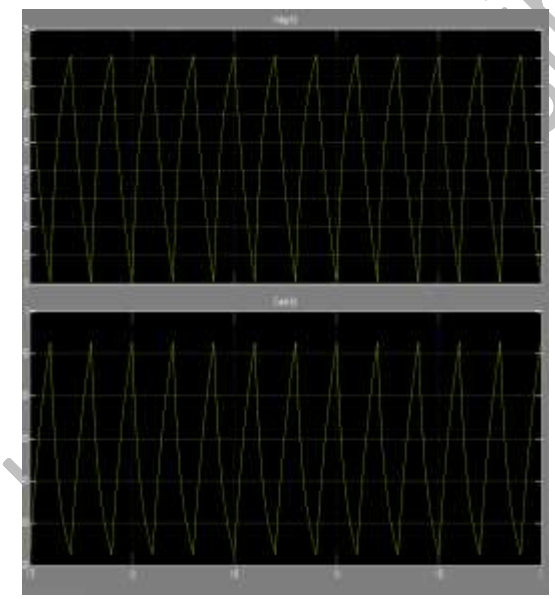


Fig 9: Baterry outputs a) voltage b) current

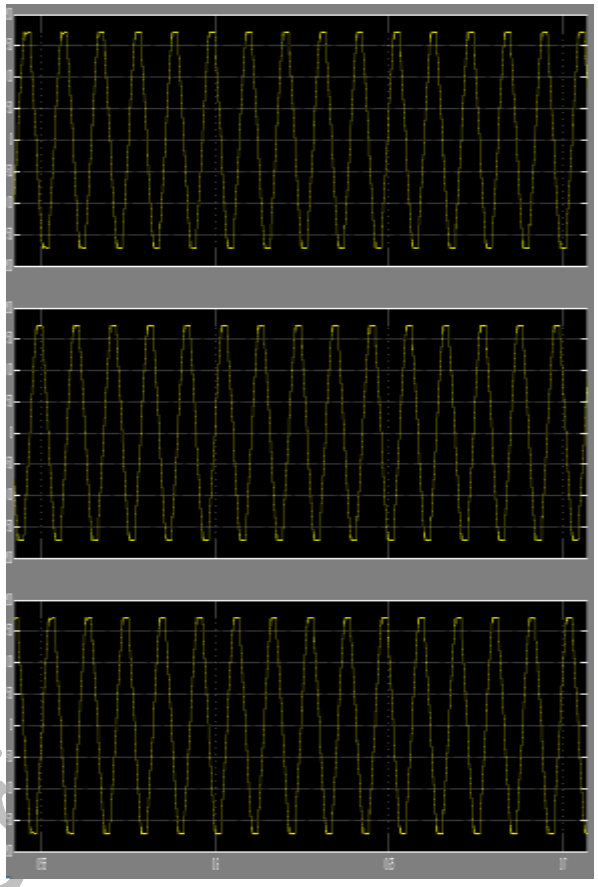


Fig.10: Wind output voltage

Conclusion

In these work, the plan of a dc micro grid based wind power generation system in a micro-grid that empowers equal activity of a few WGs in a poultry ranch have been introduced. When contrasted with regular wind base power generation system, the proposed micro-grid engineering disposes of the requirement for voltage and recurrence synchronization, in this manner permitting the WGs to be turned on or off with insignificant aggravations to the micro-grid activity. The plan idea has been checked through different test situations to exhibit the operational ability of the proposed micro-grid and the simulink results has indicated that the proposed technique idea can offer expanded adaptability and unwavering quality to the activity of the micro-grid. Be that as it may, the proposed control configuration despite everything requires further trial approval since estimation problems because of problems of the voltage and current sensors, and demonstrating blunders because of varieties in genuine system boundaries, for example, conveyance line and transformer impedances will influence the exhibition of the controller in down to earth usage.The recreation

results got and the examination acted in this paper fill in as a reason for the structure of a dc system based wind power generation system in a micro-grid.

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