

Performance and Power Flow Analysis of Double-Fed Induction Motor using ANN

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Abstract: The doubly-fed induction generator (DFIG) system is an acclaimed structure where the force electronic interface controls the rotor streams to achieve the variable speed essential for most prominent imperativeness get in factor winds. ANN based control is applied and the outcome is looked at for the stator control, rotor control and more and result shows that the smooth power flow control is kept up utilizing the ANN approach.

Keywords –ANN, Double-fed Induction Generator

1. Introduction

A Doubly Fed Based Induction generator as its name then proposes that it is the 3-stage enlistment generator one in which both the rotors and the stators based windings are then taken care of with the 3 stages AC signals. It comprises of multi stage windings put on both the rotor and stator bodies. It additionally comprises of a multiphase slip ring gathering to move capacity to the rotor. It is regularly used to produce power in wind turbine generators. [1]

As we are as of now recognizable, wind vitality is as of late one of the most broadly utilized inexhaustible wellsprings of vitality. Huge turbines are made to pivot as indicated by the blowing of the breeze and as needs be power is produced. By and large the breeze turbine generators work in a scope of wind speed between the cut in speed (least wind speed required for the generator to interface with the force network) and cut off speed (greatest breeze speed required for the generator to disengage from the force grid). [1] The DFIG comprises of a 3-stage wound rotor and a 3-stage wound stator. The rotor is taken care of with a 3 stage AC signal which instigates an air conditioner current in the rotor windings. As the breeze turbines turn, they apply mechanical power on the rotor, making it pivot. As the rotor turns the attractive field delivered because of the air conditioner current likewise pivots at a speed corresponding to the recurrence of the air conditioner signal applied to the rotor windings. Thus, a continually pivoting attractive transition goes through the stator-based windings one which causes

the acceptance of the air conditioning currents in the stator-based winding. In this way the speed of revolution of the stator attractive field relies upon the rotor speed just as the recurrence of the air conditioner current took care of to the rotor windings. [2]

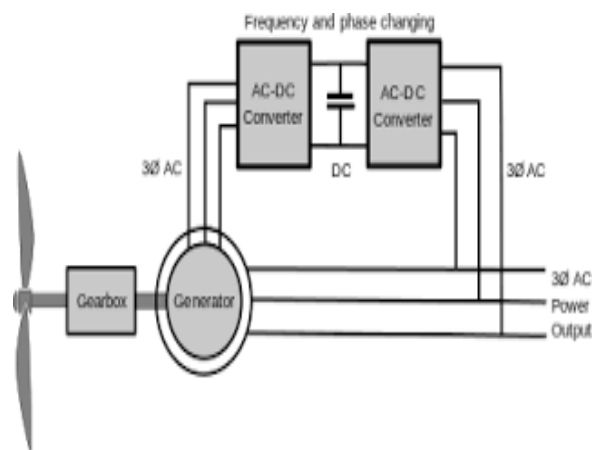


Fig 1. Doble-Fed Induction Motor

The DFIG comprises of a 3-stage wound rotor and a 3-stage wound stator. The rotor is taken care of with a 3 stage AC signal which prompts an air conditioner current in the rotor windings. As the breeze turbines turn, they apply mechanical power on the rotor, making it pivot. As the rotor turns the attractive field created because of the air conditioner current likewise pivots at a speed corresponding to the recurrence of the air conditioner signal applied to the rotor windings. Accordingly, a continually pivoting attractive transition one which goes via the stators based windings one which causes the enlistment of air conditioning current in the stator winding. Accordingly, the speed of pivot of the stator attractive field relies upon the rotor speed just as the recurrence of the air conditioner current took care of to the rotor windings. [2]

2. Literature Survey

T. Nikita, K. Manickavasagam and S. Sachin, [4] In current circumstance, the Doubly Fed Based Induction Generator (DFIG) is then contributing over

half in the wind related power age. And also the computation of the focus mishaps and also the copper incidents are crucial to dismember the electrics based machine execution.

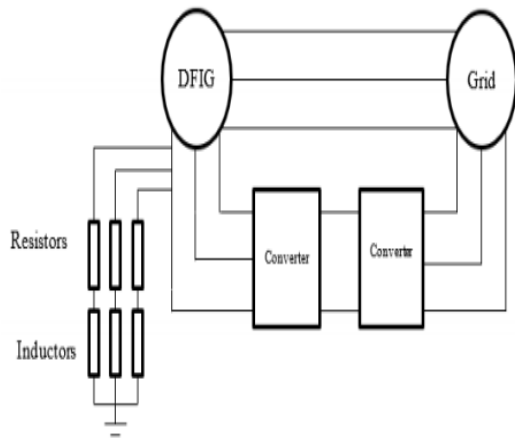


Fig 2 Simulation Model [4]

M. Hallak, M. Hasni And M. Mena, [5] author presents demonstrating and control procedure for a matrix associated doubly fed based induction generators (DFIG) that one based the wind vitality transformation framework. Control methodologies for the network side (GSC) and rotor side converters (RSC) set in the rotor-based circuit of the DFIG are introduced, alongside the scientific displaying of the utilized arrangement. Right off the bat, we built up the models of the various components of the change chain and most extreme power point following (MPPT) control system of the DFIG is applied. In addition, control vector-arranged stator motion procedure of decoupled control of the electromagnetic force (dynamic) and the receptive powers, to inspect the impact of direct I_{dr} and quadrature I_{qr} rotor flows on genuine power stator and responsive power Q_s and rotor receptive power Q_r . At long last, the reproduction consequences of 3MW wind framework are introduced in a Matlab/Simulink condition. The reenactment results are introduced and examined toward the finish of this paper.

R. R. Nair and G. Narayanan [6] Grid compromise of a doubly-took care of enlistment based generators (DFIG) structure one that requires the synchronization of the stators incited voltages with organize based voltages one before cross section affiliation, and dynamic and responsive force (PQ) based controls one that after network affiliation.

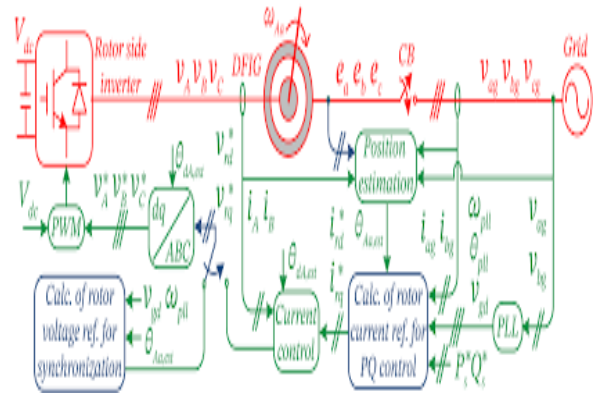


Fig 3 Concept Model [6]

N. H. Nam, [7] The paper presents the illustrating, PC multiplication's delayed consequences of a grid related with a doubly taken care of acceptance generators (DFIG) at the variable speeds (which can be higher, or lower and can even be composed speed) and accommodate the lattice simply unique force.

H. Le-Nguyen and N. Nguyen, [8] Common-mode based voltages also then known as the terrible voltages that are delivered when there is an applying of the trading methods for the voltage source based inverters (VSIs).

A. R. Kumhar, [9] Doubly Fed Induction Based Generators (DFIG) is such an acceptance based generators where its stator winding is direct connected with the structure and rotor twisting related with framework by methods for back to back based converter (Rotor Based Side Convertors) and also the Grid Based Side Convertors) close by DC interface voltage related between of them.

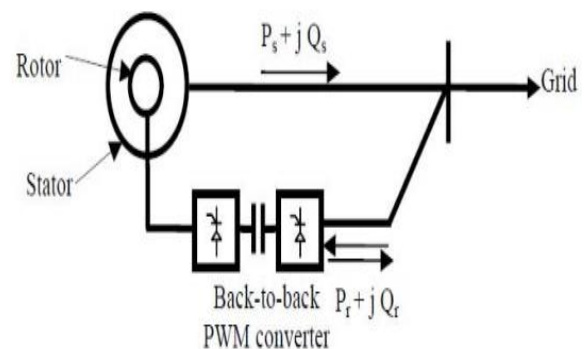


Fig 4 Model Diagram for DFIG [9]

B. S. Soares Pereira and T. Luis Maia Santos, [10] The Doubly-Fed Induction Generator licenses capable essentialness age in plants one where the turbine based speed has the non-controlled direct.

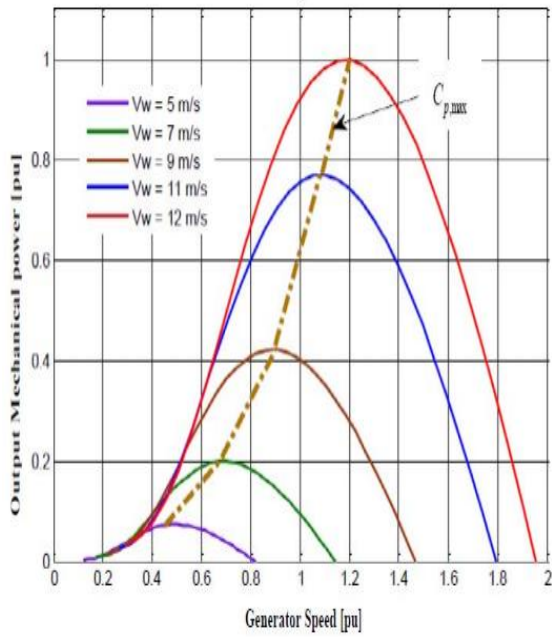


Fig 5 Mechanical Power and Rotor Speed Curves [11]

3. Proposed Algorithm

3.1 Direct Power Flow Control

For power transmission in sort out, another idea of direct power flow controller (DPFC) was proposed dependent on single-stage cooling converter with controllable stage and adequacy. By interfacing its supervised yield pay voltage with compose in strategy, DPFC can organize the plentifulness and stage edge of framework focus voltage, and as such can reasonably control dynamic and responsive power flow in cross area, only and at the same time.

Separated and joined power flow controller (UPFC), DPFC likewise has a proportional transformer and a course of action transformer in any case has no dc vitality putting away part that effectively prompts high hardware disappointment rate. Furthermore, UPFC takes after two-phase change circuit, while DPFC has just one-phase change circuit, which includes three single-stage buck-type cooling units and a three-phase yield channel. Concerning the information voltage of DPFC key circuit, the stage rule degree of its yield pay voltage is 60° , which is certainly not difficult to release up to 360° with two confirmation switches changing the association parties of the data and yield transformer.

The geology structure and operational rule of DPFC were introduced, and the test postponed results of a model indicated its reachability and checked the theoretical assessment of DPF.

3.2 Artificial Neural Network

Fake Neural Network(ANN) utilizes the treatment of the cerebrum as motivation to make calculations that can be utilized to show complex models and want problems.

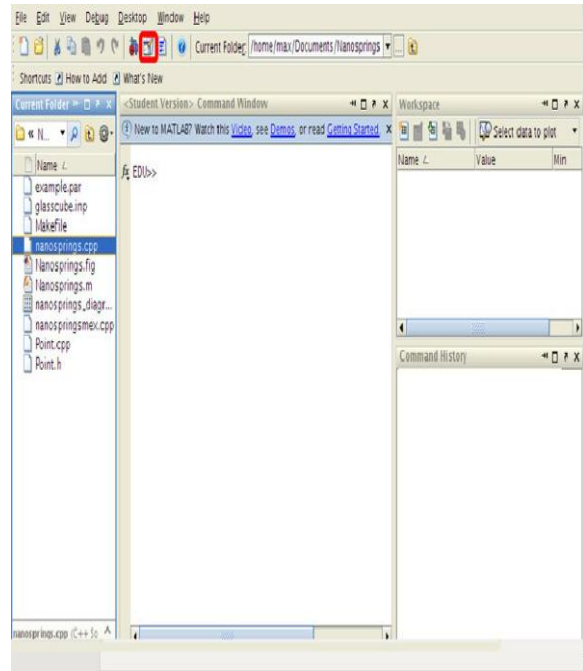


Fig 2 MATLAB Interface

The system will evaluate the performance on the year run and simulate the working and will predict the most efficient option so determining the cost of the installation , solar pv requirement and more parameter analysis using the System.

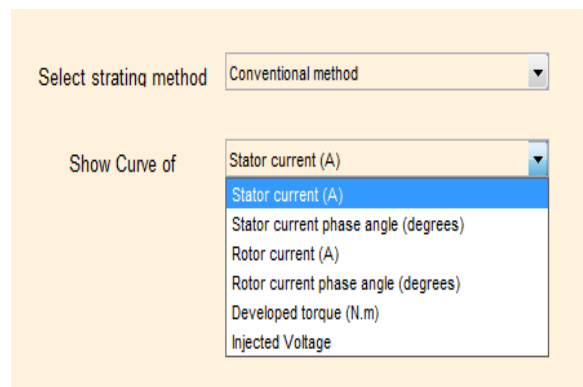


Fig 3. Curve Selection Convectional Method

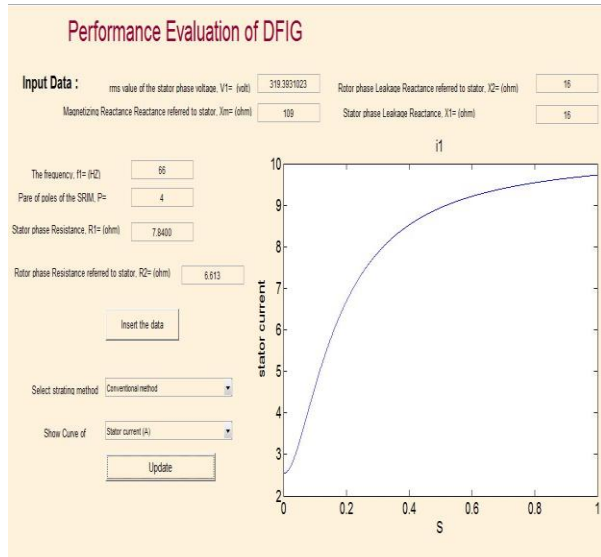


Fig 4. Performance Analysis Base Method

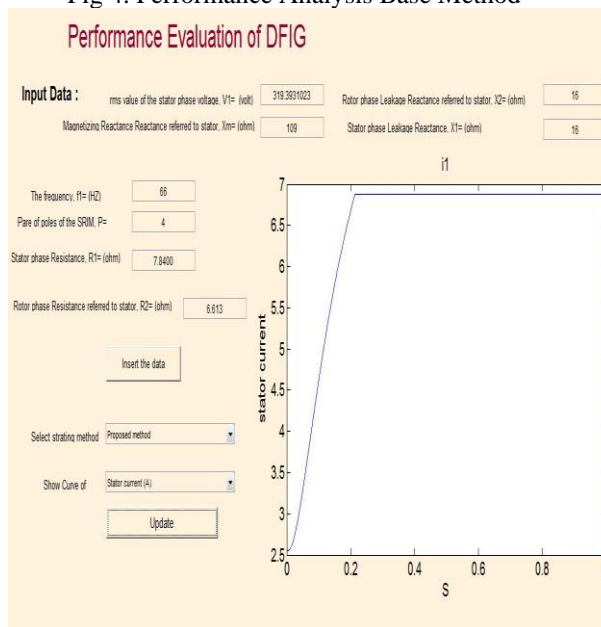


Fig 5. Performance Analysis ANN

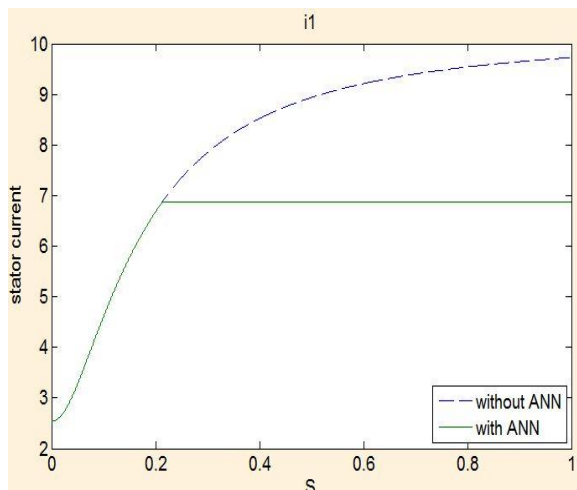


Fig 6. Stator Comparison Curve

4. Conclusion

In this undertaking, savvy control plot utilizing counterfeit neural framework (ANN) is proposed for doubly took care of acceptance generator (DFIG) based variable speed wind turbine structure. ANN based control is applied and the result is taken a gander at for the stator control , rotor control and more and result shows that the smooth power flow control is kept up using the ANN approach.

5. References

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