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Performance Analysis of DFIG Renewable energy System Using PI Controller

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Abstract: Exactly when the breeze power is connected with an electric grid impacts power quality. Power quality issues like dynamic power, reactive power, change in voltage, glint, music, and electric behavior of switching operations has to measure. Most of the wing power period structure used the doubly dealt with acknowledgment generator, due to its benefit of making sure avariable rotation and it can run above the organized worth. DFIG prevent mischief of the wind turbine part whet it is used more than the assessed speed. In the present work, with the help of PI controller scheme will get the enhancement behavior of a DFIG.

Index Terms: Power quality, wind generator, double fed induction generator, PI controller.

1. Introduction

The thriving need of electrical energy and need to preserve the nature due to reduction in fossil fuels and increased pollution of problems peoples are interested in sustainable improvement by the use of wellspring of renewable energy which ending up being astoundingly crucial for electrical power generation system. By the comparison of all renewable energy sources one of the most economical renewable source

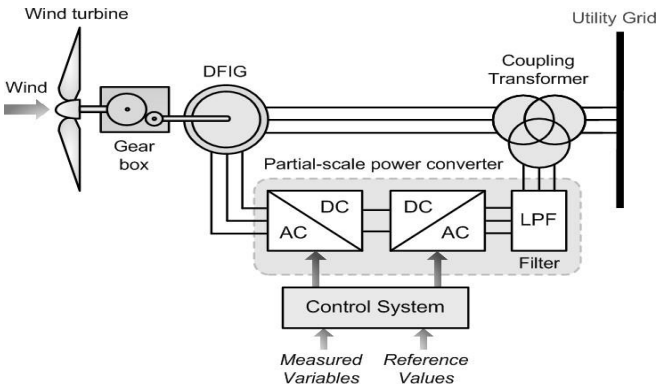

Fig.1. DFIG-based wind energy conversion systemscheme[2]

2. Mathematical Model of Doubly Fed Induction Generator

Stator and rotor equations are given as follows,

$V_{sd}=Ri_{sd}+d\Psi_{sd}-\omega d\psi_{sq}$ (1)

Is wind energysystem[1].

V $=Ri$ $+d\Psi_{sq}+\omega\psi$ (2)

Since the DFIG has many advantages so most of the
sq ssq dtssd

making plant actually used it [2], like it can work on different speed mode, provide almost constant frequency[3],reduced mechanical stresses[4].The employment of doubly dealt with enrollment generator for the period of additional power[5].
Vrd=Rrird=Ri+dΨrd−(ω+dΨrq−(ω−ω)Ψrq− ω)ψ (4)

Most of the countries have wind energy conversion system is a very popular non-conventional power generation technology [6].In wind energy generation system previously used generators are induction generator and synchronous generator. DFIG is magnificent choice for variable and unpredictable wind speed[10].

The doubly dealt with enrollment generator base wing generation system is shown in fig. 1[7-8]. DFIG including an induction generator (wound rotor type) and a conversion system means rom AC to Dc or from DC to AC and PWM voltage source converter with IGBT trading. Stator winding connected directly to the gridwithconstantfrequency50 Hz

Where,

$$\Psi_{sd} = L_s i_{sd} + L_m i_{rd} \quad (5)$$

$$\Psi_{sq} = L_s i_{sq} + L_m i_{rq} \quad (6)$$
$$\Psi_{rd} = L_r i_{rd} + L_m i_{sd} \quad (7)$$
$$\Psi_{rq} = L_r i_{rq} + L_m i_{sq} \quad (8)$$

3. Methodology &Result

By using equations (15),(16),(19)and(20),obtain the simplified model of the DFIG presented in figure2.

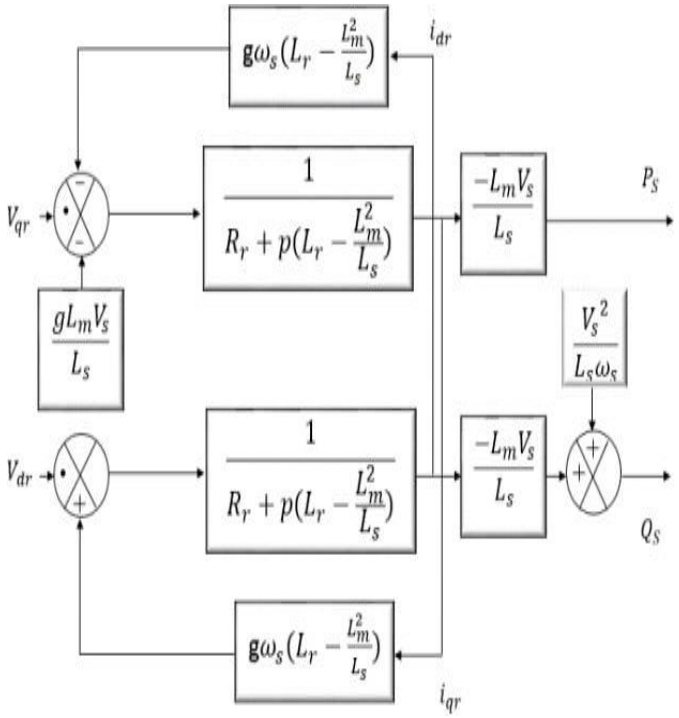

Fig.2.DFIG

4. PI Controller Design

For the speed control of the structure various methodology are used,out of them PI controller is outstandingly versatile and used for speed control of motor and generator at power plants. In the present work we use the PI controller with static analysis control. It help us stable movement of the system, as shown in figure3 [11].

Wing turbine simulation model is shown in figure.4

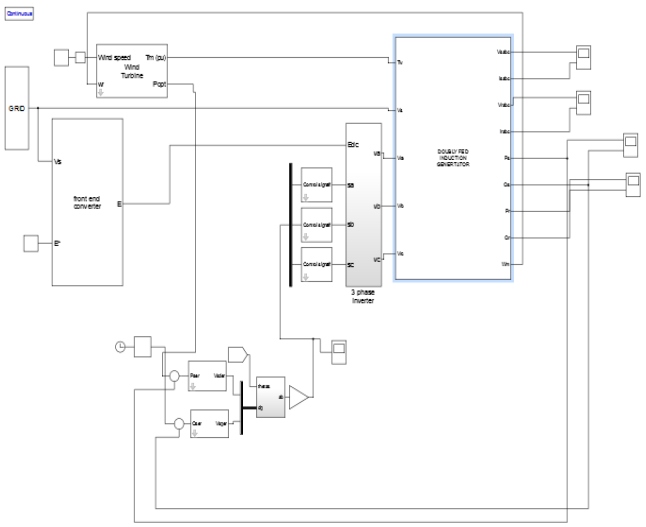

Fig.3DFIGSimulinkmodel

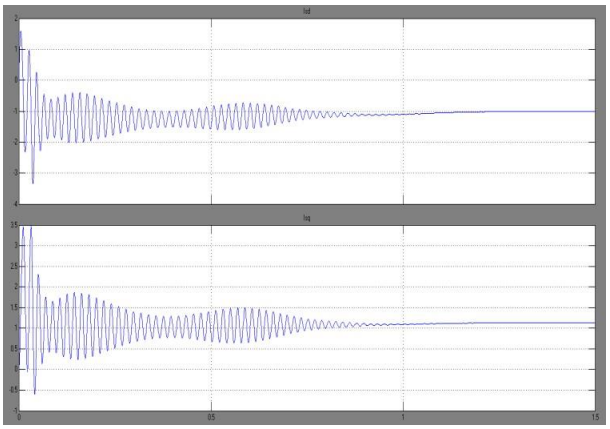

Fig.4 characteristic of active and reactive power aftercontrolaction

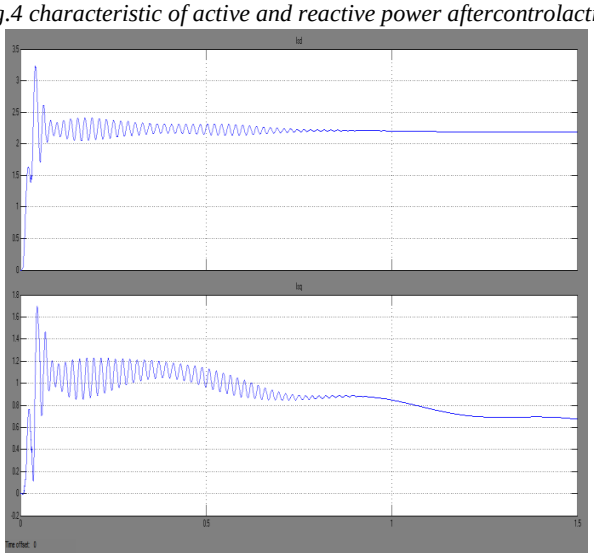

Fig.5 characteristic of reactive power aftercontrolaction

5. Conclusions

In this work we consider the DFIG for the constant operation of the breeze plant. As we presumably know that procuring the stable response of wind power plant is incredibly difficult endeavor. DFIG help us to secure stable movement anyway an enormous piece of the cases it required some controlling action for generating constant output power. Here

consider PI controller for the assistance of the DFIG steady and stable movement. Eventual outcomes of Simu link model of wind generator with PI controller shows the constant action of the plant. Thusly, it's done that the PI controller with static information dealt with doubly dealt with induction generator provides stable operation and gives constant output power.

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