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Increase The Efficiency In Wind Turbine System By Using DFIG

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Abstract: **The problem of fault estimation victimization adjective fault identification observer technique for a DFIG based mostly turbine system. This adjective fault estimation algorithmic program is planned to boost the quickness and accuracy performance of fault estimation. Tn particular, associate degree electrical fault situation, the DFTG winding short circuit fault, is taken into account as a result of its high prevalence rates. supported the fault estimation data, a fault compensator is intended supported fault data provided by the fault identification theme to ensure the stability of the system, and it incorporates with a traditional controller to supply an internet fault compensation of winding contact faults. Finally, the implementation of the planned approach and therefore the results obtained from its application to the DFTG based mostly wind turbine system square measure bestowed parenthetically the potency of the planned methodology.**

Keywords: **Wind Generator; DFIG; Short Circuit; Adaptive Observer; Fault Estimation; Fault Diagnosis; Fault Compensation;**

I. INTRODUCTION

Recently, the penetration rate of wind energy has reached important levels in several countries [3]. In recent years, doubly-fed induction generator (DFIG), as a variable speed generator, has attracted a good interest for application with wind energy. Victimization DFIG might deliver the goods several benefits such as operation over a good vary of rotor speeds and decrease the number of power carried by the converter with substantial reduction in converter value. However, DFIG suffers from high sensitivity to grid disturbances, particularly grid current faults that might lead to native or system wide instabilities. So, there is an ought to improve the flexibility of wind turbines to remain connected to the electricity grid even with grid faults so as to produce the support required by the system once the fault is cleared. Many studies have been applied so as to realize the inquired systems reliability, particularly for DFIG-based turbine conversion system. Among these, one in all the foremost commonly used schemes for fault identification and fault tolerant management, are associated with adjective observer-based approaches. The aim of this paper is to research model-based fault estimation schemes and develop adjustive observer techniques to diagnose DFIG single-phase short faults particularly inside stator coil windings, and conjointly use the estimated states to reconstruct the controller therefore on compensating the consequences of faults. The contents of this paper are as follows. Firstly, a mathematical model of the DFIG with relevancy single phase short circuit faults inside stator coil windings are proposed. Secondly, supported this planned fault model, an adjustive observer based mostly fault identification theme is proposed that permits on-line diagnosis of the fault level and site. Next, supported the planned fault diagnosis theme, a fault compensator is developed and integrated to the system that is in a position to produce AN online compensation of any potential winding short circuit faults. Finally, simulation results are bestowed and show that this fault compensator will extremely cut back the oscillations within the magnetic force, an output power and a few different electrical quantities within the presence of short faults.

II. PREVIOUS STUDY

The winding contact fault, particularly at intervals stator windings, is one in every of the foremost common faults in electric machines together with DFIGs. This fault could occur within one part or typically in many phases simultaneously. During this work, we tend to denote the previous case: the single-phase fault. During this section, we aim to develop a mathematical model of DFIG with regard to the single-phase contact fault at intervals mechanical device windings. Once a brief circuit fault happens, the stator windings currents become asymmetrical, and a noticeable increase will be discovered within the current of the faulted phase. This is often as a result of the effective resistivity of the faulted part is reduced by the contact. The modelling strategy is to contemplate the contact loops as some further circuits placed in parallel to the first winding circuits of DFIG, then represent the electrical and magnetic relationships among of these circuits by mistreatment circuit theory. The sequence part decomposition could be a wide used technique managing the structural spatial property problems of the electrical machines. In this section, standard curved signal decomposition the technique is introduced. By mistreatment this method, the single-phase fault model projected is reworked into a state-space model illustration and also the fault is formulated into associate degree additive fault current.

III. DESIGN EXAMPLE OF EXTERNAL INDUCTOR

For a closed-loop controlled DFIG turbine under the traditional management strategy, since the measured outputs (currents) square measure fed to the controller to adjust the system target outputs (electromagnetic torsion and output power), any asymmetries within the currents will ultimately result in the oscillations within the magnetism torque, and therefore the increase in the magnitude of oscillations in the output power. so as to scale back the on top of mentioned effects on a closed-loop controlled DFIG wind a turbine system, a fault compensator is projected as shown in figure a pair of, and it's combined with a traditional controller specified the oscillations within the torsion will be removed and therefore the oscillation amplitude in output power can be reduced. The adaptive observer algorithms projected in on top of sections square measure simulated so as to investigate and assess the estimation and designation of a single-phase short circuit applied to a mechanical device winding. The simulation studies square measure administrated within the Mat lab/Semolina environment. Before presenting the most results of faults estimation, it's crucial to say that, the observer is activated at t=2sec once the DFIG reaching the steady state, and thenceforth a brief circuit fault is applied to stator section 'a' at t=2,5sec.

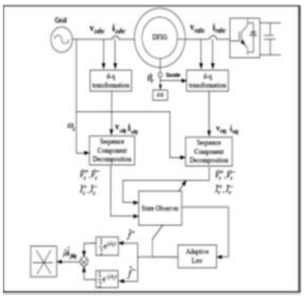

Fig.3.1.Proposed Diagram.

IV. SIMULATION RESULTS

In this subdivision, as a primary step, we have a tendency to aim to research the behaviour of the fault currents (If and Ifq), which has different signatures for 3 totally {different completely different} fault positions (phase 'a', 'b', or 'c'). That analysis results area unit crucial to be used later for the fault position identification. For that purpose, a brief circuit fault is introduced into mechanical device phase 'a', 'b' and 'c', severally, and for every case the simulations results area unit bestowed in Fig. The adaptation observer primarily based fault identification theme is foremost used to produce a web identification of the short circuit faults, and meantime estimate faulty currents elements. These elements area unit then utilized within the fault compensator to get rid of the influences of the fault.

To check the performance of the DFIG turbine system before and once the fault compensation, and to envision the enhancements of victimization the fault compensator on the output variations, simulations results area unit incontestable.

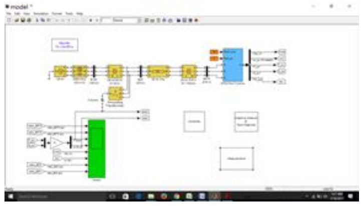

Fig.4.1.Simulation circuit.

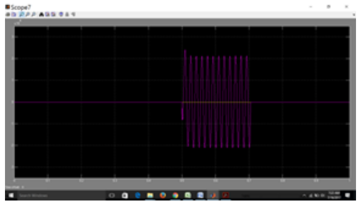

Fig.4.2.Output Wave forms.

V. CONCLUSION

An adaptation observer technique for a model-based fault diagnosing was developed so as to improve the responsibility of DFIG mechanical device windings short circuit fault among turbine systems. Then, an active fault tolerant theme was synthesized based mostly the fault information provided by the fault diagnosing theme. For this purpose, a fault compensator was designed, and then used to correct the present measurements and reference signals. This fault compensator was valid on a closed-loop controlled DFIG turbine system, and the simulation results showed that it will extremely scale back the oscillations within the magnetism force, output power and different output electrical quantities aroused by winding contact faults.

VI. REFERENCES

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