

A DFIG Based Grid Connected Wind power System for Power Quality Enhancement Using Fuzzy Controlled UPQC

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Abstract

This paper presents three stages Static Synchronous Compensator framework utilizing Fuzzy rationale controller. STATCOM is a Shunt gadget which is equipped for trading both genuine and receptive power. A novel voltage control in view of P-Q hypothesis utilizing fluffly rationale controller has been intended for the STATCOM framework. MATLAB recreation can be utilized to investigate the execution of STATCOM utilizing PI controller and in addition Fuzzy rationale controller. The trouble with respect to the PI controller pick up is the adjusting of the controller in order to accomplish the ideal activity of the errand. The significant disadvantage of the PI controller is confronted when the procedure is nonlinear and furthermore when the framework is having motions. From the outcomes acquired Total Harmonic Distortion (THD) for STATCOM utilizing Fuzzy rationale controller is decreased.

Keywords: - THD, Fuzzy logic controller, UPQC.

1. INTRODUCTION

Doubly-fed induction generator

Variable speed wind turbines such as DFIGs are the most popular wind turbines being installed today because they perform better than the fixed speed wind turbines during system disturbances. DFIGs are the only class of wind generators capable of producing reactive power to maintain unity power factor at the collector bus.

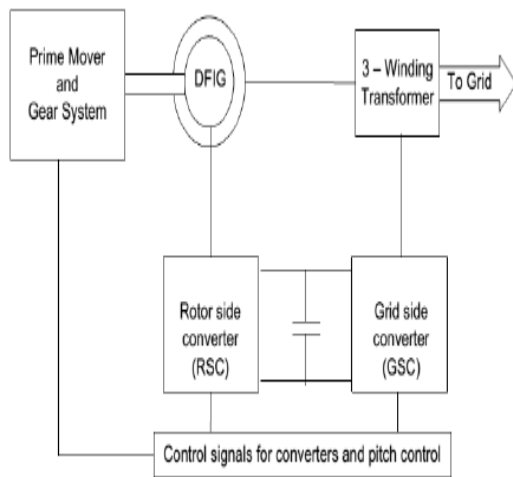


Fig:-1 Block diagram of a Doubly-fed induction generator

2. IMPLEMENTATION

A consecutive converter is associated between the rotor and stator of the DFIG. The fundamental goal of the GSC is to keep the DC connect voltage steady. The responsive power provided by this converter can be controlled by keeping up the power factor of this converter at solidarity. The GSC fills in as supplementary responsive power pay however the receptive power capacity of this converter amid the blame is restricted as it is evaluated pretty much 25% of the breeze turbine control appraisals. RSC controls the stator dynamic and responsive forces. The RSC is additionally used to control the machine speed and the stator receptive power. The stator of the DFIG is straightforwardly associated with the lattice and the slip-rings of the rotor are encouraged without anyone else commutated converters. The size and period of the rotor voltage can be controlled utilizing these converters which influences dynamic and receptive capacity to control conceivable. By controlling the responsive power produced or consumed by the RSC, voltage or receptive power at the framework terminals can be controlled

Unified power quality conditioner

The Unified Power Quality Conditioner (UPQC) which coordinates an arrangement and shunt dynamic channel can adjust: supply voltage hang or swell voltage and current unbalance or sounds, receptive power and current negative with zero groupings (impartial current). The UPQC has the capacity of enhancing power quality at the purpose of establishment on control dispersion

frameworks or modern power frameworks. At last, the UPQC is relied upon to be a standout amongst the most intense answers for high limit delicate burdens. the general structure of an UPQC with the mix of an arrangement (DVR) and shunt (DSTATCOM) dynamic channel. UPQC will be introduced by the need. In this manner, it ensures against arrange voltage annoyances in the heap side or secures alternate buyers in the sub-transmission side.

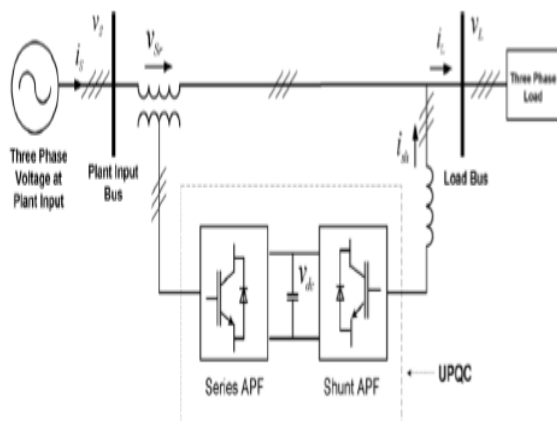


Fig:-2 UPQC general structure

3. IMPORTANCE OF FUZZY LOGIC

Fluffy rationale is about the relative significance of exactness: use as Fuzzy Logic Toolbox programming with MATLAB specialized processing programming as a device for taking care of issues with fluffy rationale. Fluffy rationale is a captivating region of research since it completes a great job of exchanging off amongst criticalness and accuracy something that people have been overseeing for quite a while. In this sense, fluffy rationale is both old and new in light of the fact that, in spite of the fact that the cutting edge and orderly art of fluffy rationale is as yet youthful, the idea of fluffy rationale depends on age-old abilities of human thinking.

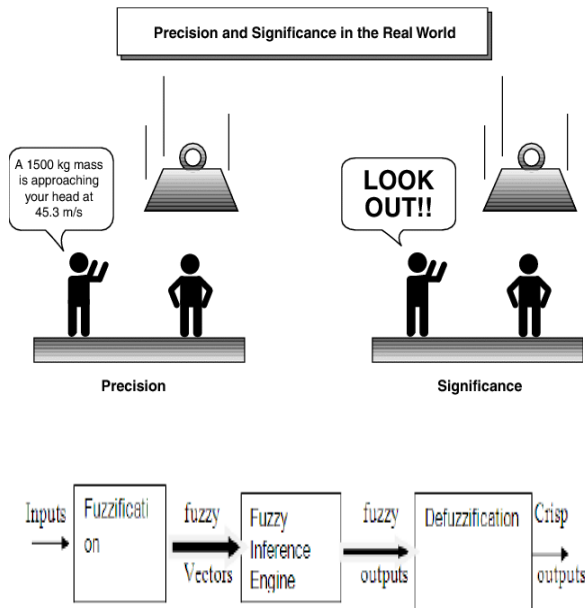


Fig:-3 Fuzzy inference system.

4. PROPOSED CONCEPT

Power Quality (PQ) is used to describe electric power that drives an electrical load and the load's ability to function properly. Power Quality determines the fitness of electric power to consumer devices.

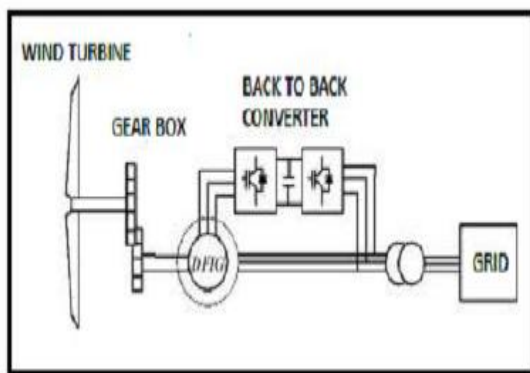


Fig:-4 Grid connected DFIG based wind power system

5. EXPERIMENTAL RESULTS

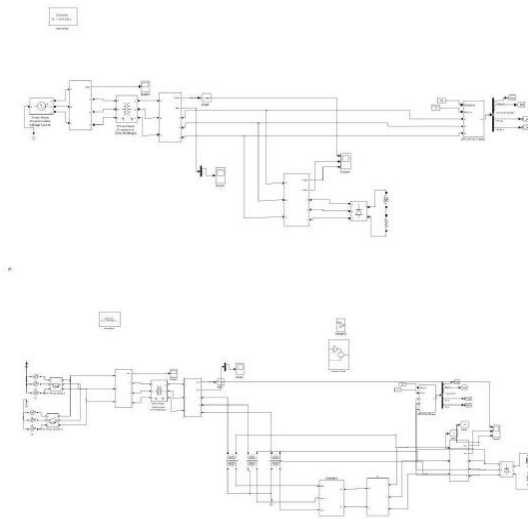


Fig:-5 Simulation circuit diagrams

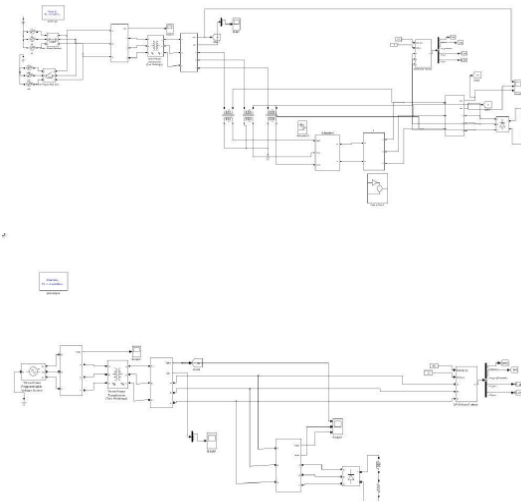


Fig:-6 Simulation circuit diagrams

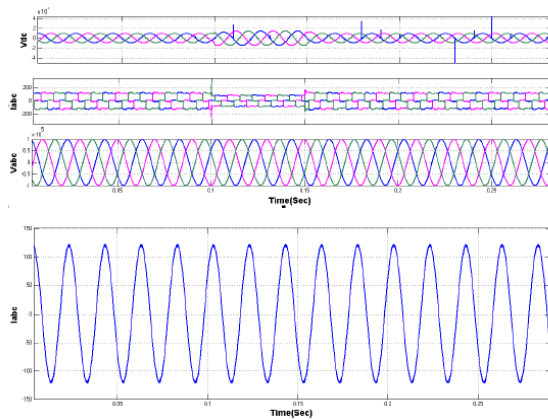


Fig:-7 extension_NN117_upqc_swell_hybridfuzzy

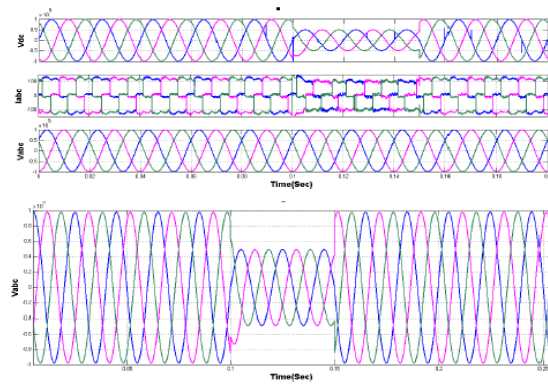


Fig:-8 NN117_upqc_sag_fig13_14_15_base_thd

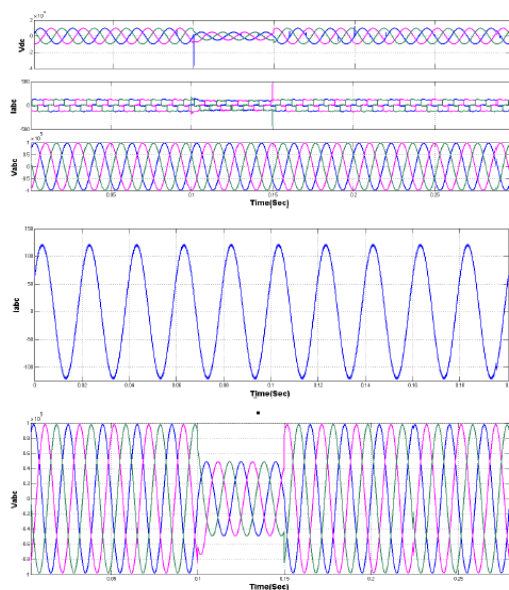


Fig:-9 NN117_upqc_sag_fuzzy_fig17_18_19

6. CONCLUSION

This paper spotlights both Voltage and Current quality change in a Grid associated DFIG based breeze control framework. The PQ issues - voltage hang and current sounds are mimicked utilizing MATLAB in a matrix associated wind control framework. The fluffy controlled UPQC is actualized for PQ improvement to decrease both voltage list and current music and the reproduction comes about are additionally contrasted and traditional PI controller. From the reproduction comes about, the PI controlled UPQC totally mitigates voltage hang yet the heap current sounds got isn't inside the adequate limits. The proposed Fuzzy Logic Controlled UPQC totally mitigates voltage hang. Furthermore, the heap current sounds are relieved superiorly by keeping THD level of load current inside worthy limits according to IEC standards. Hence the proposed Fuzzy controlled UPQC is effectively demonstrated as productive gadget through its exceptional execution for enhancing PQ in a framework associated wind control framework.

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