IJARES/November 2015/Volume-3/Issue-11/2187-2193 **ISSN 2347- 9337**

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN ENGINEERING AND SCIENCE

SCHEMING OF AN EFFECTIVE WIND TURBINE SYSTEM FOR STUDYING OF MITIGATION PROBLEMS

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ABSTRACT:

With the enhancement of wind power penetration into grid, power quality turn into an essential problem. An individual pitch control system is proposed for flicker improvement of grid associated wind turbines. The notion of instability of visual sensation that is induced by light stimulus, whose luminance varies with time, denotes Flicker. Our work will provide MW-level variable speed wind turbine by a doubly fed induction generator to examine flicker emission as well as the issues of mitigation. An individual pitch control is proposed to decrease flicker emission at various wind speed conditions. Individual pitch control mechanism as well as individual pitch controller is considered consistent with generator active power as well as azimuth angle of wind turbine.

Keywords: Wind power, Flicker, Doubly fed induction generator, Wind turbine, Pitch control, Power quality.

1. INTRODUCTION:

By the increasing concerns regarding energy shortage as well as environmental pollution, several important works were made for implementation of renewable energy sources, particularly wind power. One significant feature of power quality is flicker as it might turn into a limiting factor in support of integration of wind turbines into

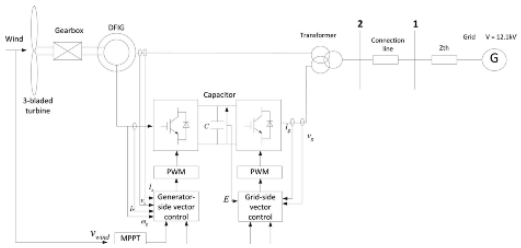
weak grids as well as strong grids when penetration levels of wind power are high [1]. Several solutions were presented to mitigate flicker emission of grid associated wind turbines. Apart from conditions of wind power source, features of power system will have an impact on flicker emission regarding grid associated wind turbines. Static synchronous compensator has received important attention which is moreover adopted to decrease flicker emission. In contrast, it is not likely to be economically practicable for applications of distributed generation. In the recent times, individual pitch control which is a capable technique for reduction of loads were projected from which it is noteworthy that individual pitch control for structural load decrease has minute impact on electrical power. Individual pitch control method for flicker mitigation that is proposed might be equally appropriate towards other types of uneven speed wind turbines. In our work an individual pitch control technique is proposed for flicker improvement of grid associated wind turbines. While changeable speed wind turbines comprise improved performance regarding flicker emission than fixed speed wind turbines, with huge enhance of wind power penetration level, flicker study on uneven speed wind turbines turn out to be necessary. The power oscillations that are attenuated by pitch angle adjustment consistent with generator active power feedback as well as wind turbine azimuth angle such that voltage fluctuations are smoothed importantly, leading to the flicker mitigation [2][3]. Our work will present MW-level variable speed wind turbine by a doubly fed induction generator to examine flicker emission as well as the issues of mitigation. As a lot of individual pitch control techniques will moderate wind turbine loads, the proposed individual pitch control system which can moderate flicker emission may have a number of impact on wind turbine load. A strategy of individual pitch control is projected to decrease flicker emission at various wind speed conditions. Individual pitch control system is projected and individual pitch controller is considered consistent with generator active power as well as azimuth angle of wind turbine.

2. METHODOLOGY:

Quite a lot of solutions were presented to mitigate flicker emission of grid associated wind turbines. The most usually adopted method that is used is reactive power

compensation on the other hand; method of flicker mitigation will shows its limits in several distribution networks in which grid impedance angle is small. Active power control by means of altering the dc-link voltage of back-to-back converter is obtainable to moderate flicker emission. On the other hand, big dc-link capacitor is necessary, and duration of capacitor will be shortened to store up fluctuation power within dc link. An open-loop pitch control is used to examine flicker emission in high wind speeds; on the other hand, pitch actuation system is not considered. While the pitch rate as well as time delay of the pitch actuation system make huge contributions to results of flicker emission of inconsistent speed wind turbines, it is essential to consider these factors. Individual pitch control which is a competent technique for reduction of loads was projected from which it is noteworthy that individual pitch control for structural load decrease has minute impact on electrical power. Because of variation of wind speed, wind shear effects, grid associated wind turbines are sources of power fluctuations which might construct flicker throughout continuous process. Features of power system will have an impact on flicker emission regarding grid associated wind turbines. Flicker may turn into a limiting factor in support of integration of wind turbines into weak grids as well as strong grids when penetration levels of wind power are high. Flicker is induced by means of voltage fluctuations that are caused by means of load flow changes within the grid. Individual pitch control is projected to decrease flicker emission at various wind speed conditions and the proposed control system is projected and individual pitch controller is considered consistent with generator active power as well as azimuth angle of wind turbine [4]. Grid associated variable speed wind turbines are variable power sources throughout constant process. The power fluctuations that are caused by wind speed difference, wind shear leads to voltage fluctuations within network, which might produce flicker. The flicker emission by various types of wind turbines is relatively different. Although variable speed wind turbines include improved performance regarding flicker emission than fixed speed wind turbines, with huge enhance of wind power penetration level, flicker study on uneven speed wind turbines turn out to be necessary.

3. AN OVERVIEW OF PROPOSED SYSTEM:



Overall scheme of the DFIG-based wind turbine system.

IPC which is a promising way for loads reduction has been proposed from which it is notable that the IPC for structural load reduction has little impact on the electrical power. However in this paper, an IPC scheme is proposed for flicker mitigation of grid-connected wind turbines. The power oscillations are attenuated by individual pitch angle adjustment according to the generator active power feedback and the wind turbine azimuth angle in such a way that the voltage fluctuations are smoothed prominently, leading to the flicker mitigation. The influence of the flicker emission on the structural load is also investigated. The FAST (Fatigue, Aerodynamics, Structures, and Turbulence) code [12] which is capable of simulating three-bladed wind turbines is used in the simulation. Individual pitch control is a capable technique for reduction of loads was projected from which it is noteworthy that individual pitch control for structural load decrease has minute impact on electrical power. In our work an individual pitch control technique is proposed for flicker improvement of grid associated wind turbines. As many individual pitch control techniques will moderate wind turbine loads, the proposed individual pitch control system which can moderate flicker emission may have a number of impact on wind turbine load. A strategy of individual pitch control is projected to decrease flicker emission at various wind speed conditions. Individual pitch control system is projected and individual pitch controller is considered consistent with generator active power as well as azimuth angle of wind turbine. There are moreover drawbacks of proposed individual pitch control techniques in low wind speed as well as high demand of pitch actuation system. Individual pitch control technique for flicker mitigation that is proposed might be equally appropriate towards other types of uneven speed wind turbines [5]. Overall system of a doubly fed induction generator basis wind turbine structure includes wind turbine, gearbox, a back-to-back converter which includes rotor side converter and dc-link capacitor as energy. For a doubly fed induction generator basis variable speed wind turbine, objective

is different consistent with various wind speed. In low wind speed, objective is to maintain tip speed ratio best possible, so that highest power is captured from wind. In high wind speed, while obtainable power is ahead of wind turbine capability, which might overload system, the intention is to maintain extracted power stable at its rated value. Methods of vector control are commonly used for a back-to-back converter within wind turbine system [6]. The vector control purpose for rotor side converter is to put into practice maximum power tracking from wind by means of controlling electrical torque of doubly fed induction generator.

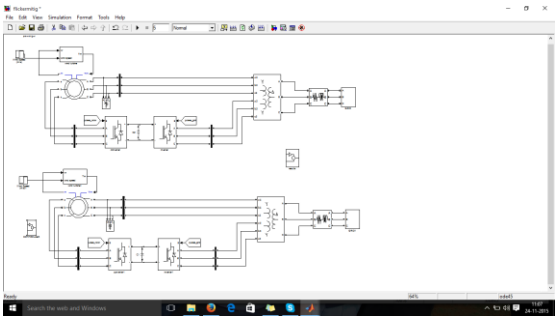


Fig 1: proposed converter of wind generation

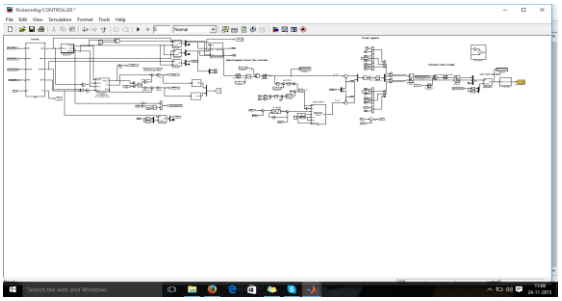


Fig 2: proposed converter controller for wind generation

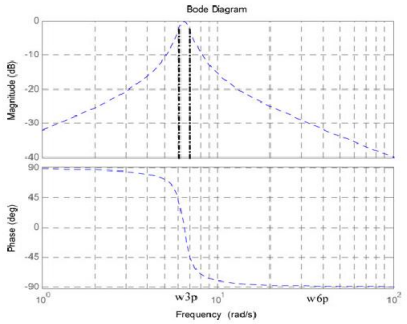


Fig 3: bpf chars in freequency domine

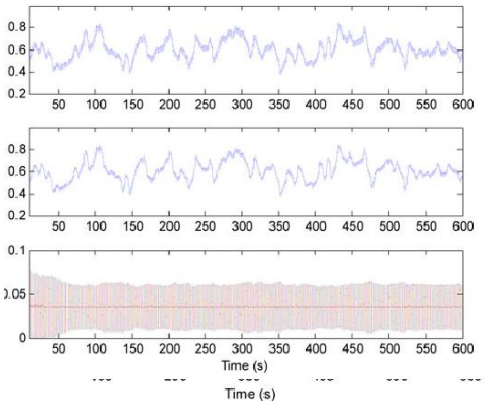


Fig 4: power with with out ipc and pitcg angle in case 3

4. CONCLUSION:

Quite a lot of solutions were presented to mitigate flicker emission of grid associated wind turbines. Characteristics of power system will have an impact on flicker emission regarding grid associated wind turbines. Due to difference of wind speed,

wind shear effects, grid associated wind turbines are sources of power fluctuations which might construct flicker throughout continuous process. Flicker is induced by fluctuations of voltage that are caused by means of load flow changes within the grid. Flicker may turn into a limiting factor in support of integration of wind turbines into weak grids as well as strong grids when penetration levels of wind power are high. The power fluctuations caused by wind speed difference, wind shear leads to voltage fluctuations within network, which might produce flicker. Flicker emission by various types of wind turbines is relatively different and our work will present an individual pitch control technique for flicker improvement of grid associated wind turbines. Our work will provide MW-level variable speed wind turbine by a doubly fed induction generator to examine flicker emission as well as the issues of mitigation. Individual pitch control is projected and individual pitch controller is considered consistent with generator active power as well as azimuth angle of wind turbine and moreover the proposed approach decrease flicker emission at various wind speed conditions.

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