IJARES/November 2015/Volume-3/Issue-11/ 2207-2212 **ISSN 2347- 9337**

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN ENGINEERING AND SCIENCE

AN EFFECTIVE APPROACH TOWARDS MANAGING OF RELAYING POWER GRID ISSUES

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ABSTRACT:

While the wind energy plays an important role in energy industry, technology of wind power generation has gained more concentration. The operation features of doubly fed induction generator within the condition of low voltage ride through have a huge effect on fault features of voltage as well as current. Research works should be performed to study features of fault current of doubly fed induction generator in non-severe fault circumstances. In the non severe condition faults, crowbar security is not turn on and rotor windings of doubly fed induction generator are excited still by the converter. In these, active response of rotor-side converter contains a huge influence on fault current features of doubly fed induction generator. We recommend an analysis technique for fault current features of doubly fed induction generator in non-severe fault conditions. An assessment of active response of rotor-side converter is made on condition that control loop of external power is shutdown and reference signals of control loop of inner rotor current are maintained stable. Easy representation of rotor fault current is recognized in relation to various principles of inner rotor current controller. Based on these, fault features of stator current are considered and analytical expressions of stator fault current are attained.

Keywords: Wind energy, Doubly fed induction generator, Crowbar, Rotor-side converter, Non-severe fault.

1. INTRODUCTION:

By the increasing grid-connected wind power ability, in order to offer grid support throughout grid voltage dips, novel grid codes were developed to require wind turbines to contain low voltage ride through. The rising penetration of doubly fed induction generators will bring numerous problems to conventional relaying security of power grid, as relaying protection will identify fault element on basis of change features of electrical quantities. For fault current features of doubly fed induction generator on situation that a severe fault occurs and crowbar protection is turn on, several works were carried out [1]. For dealing of problems of relay protection of power grid by penetrations of doubly fed induction generator, fault current features of doubly fed induction generator have to be studied. Theoretical analysis process for fault current features of doubly fed induction generator in non severe fault circumstances is projected. In our work we propose an analysis technique for fault current features of doubly fed induction generator in non severe fault conditions. Initially the active response of rotor-side converter is assessed on condition that control loop of external power is shutdown and reference signals of control loop of inner rotor current are maintained stable [2][3]. Later the simple calculation representation of rotor fault current is recognized in relation to various principles of inner rotor current controller. On the basis of these, fault features of stator current are considered and analytical expressions of stator fault current are attained.

2. METHODOLOGY:

During the fault of non severe conditions, crowbar security is not turn on and rotor windings of doubly fed induction generator are excited still by the converter. In these situations, dynamic response of rotor-side converter contains a huge influence on fault current features of doubly fed induction generator. In severe faults which take place close to doubly fed induction generator and cause stator voltage to drop seriously, to make sure safety of doubly fed induction generator, crowbar protection is activated to short circuit rotor windings. In non-severe faults which take place far away from doubly fed induction generator, crowbar protection is not activated. The fault current features of doubly fed induction generator, for instance transient components as well as damping time constant, are unlike in two

conditions on the other hand, they are different from conventional synchronous generator hence it is required to study fault current features of doubly fed induction generator under these two situations independently. For fault current features of doubly fed induction generator on situation that a severe fault occurs and crowbar protection is turn on, several works were carried out. In non-severe fault circumstances, active response of converter will result in more difficult fault current characteristics of doubly fed induction generator that are tricky to analyze. In non-severe faults, fault current that is provided by doubly fed induction generator that consists of stator fault current as well as grid side fault current of grid side converter. Fault current of doubly fed induction generator is studied on the basis of assumption that excitation current will maintain stable before as well as after fault occurrence and after that keep stable during grid faults. For handling of problems of relay protection of power grid by penetrations of doubly fed induction generator, fault current features of doubly fed induction generator were to be studied [4]. We propose an analysis technique for fault current features of doubly fed induction generator in non severe fault conditions. Further research works have to be made to study features of fault current of doubly fed induction generator in non-severe fault circumstances.

3. AN OVERVIEW OF PROPOSED SYSTEM:

General type of wind turbine that was functional in existing wind farms is doubly fed induction generator, because of its easy structure, minute ability of converter as well as scalable power control. In non-severe faults, fault current that is provided by doubly fed induction generator that consists of stator fault current as well as grid side fault current of grid side converter. On the other hand, as ability of grid side fault current is only to some percentage of rated capacity regarding wind turbine, grid side fault current that is provided by grid side fault current is so little that it has restricted influence on fault current that is provided by doubly fed induction generator. Hence our work considers the dynamic response features as well as stator fault current are considered. Theoretical analysis process for fault current features of doubly fed induction generator in non severe fault circumstances is projected. In our work we propose an

analysis technique for fault current features of doubly fed induction generator in non severe fault conditions. The active response of rotor-side converter is assessed on condition that control loop of external power is shutdown and reference signals of control loop of inner rotor current are maintained stable. Later easy calculation representation of rotor fault current is recognized in relation to various principles of inner rotor current controller. Fault features of stator current are considered and analytical expressions of stator fault current are attained. Fault current of doubly fed induction generator is considered on the basis of assumption that excitation current will maintain stable before as well as after fault occurrence and after that keep stable during grid faults. In non-severe fault circumstances, active response of converter will result in more difficult fault current characteristics of doubly fed induction generator that are tricky to analyze. In non-severe faults which take place far away from doubly fed induction generator, crowbar protection is not activated. During the period of fault transient, it is difficult to make the doubly fed induction generator to function with unity power factor as well as capture utmost wind power; additionally measurements of active as well as reactive power are imprecise. A distinctive handling system is to minimize external power control loop during the detection of fault. The operation features of inner rotor current loop are reliant on proportional gain as well as integral gain of controller. There are two designing standards of proportional gain as well as integral gain [5]. Choosing of sufficient controller parameters to construct inner rotor current controller to be exact representative first-order system represents the first designing standard. The other is choosing of sufficient controller parameters to build inner rotor current controller which represents the representative second-order system. Based on these designs, various calculation models of rotor fault current are built. The rotate inertia time constant of doubly fed induction generator is extremely great, and alteration of electrical quantities are rapid than rotate speed during fault transient as a result, rotate speed is measured constant [6].

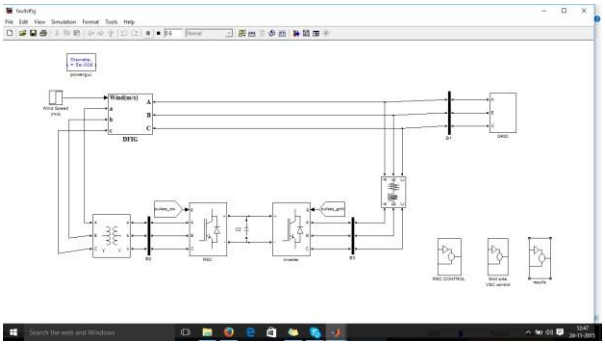

Fig 1: proposed circuit diagram of DFIG

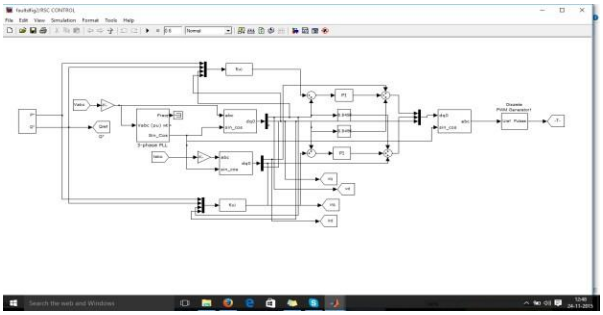

Fig 2: Proposed Rotor side controller

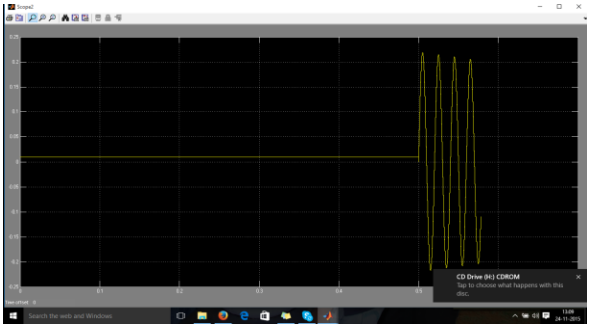

Fig 3: direct axes current of rotor

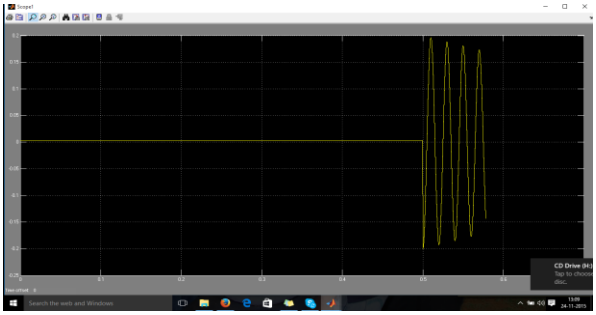

Fig 4: qudrature axes current of rotor

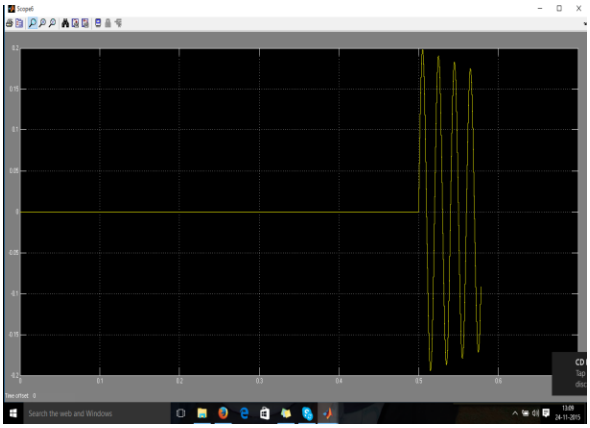

Fig 5: direct axes current of stator

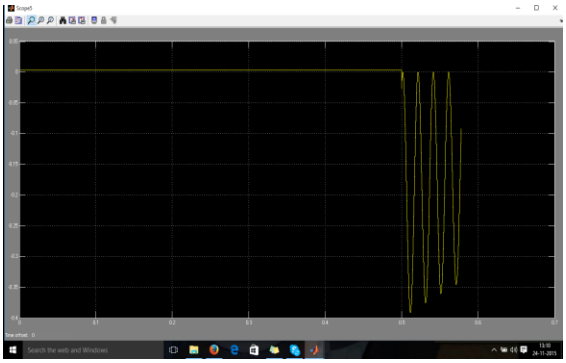

Fig 6: qudrature axes current of stator

4. CONCLUSION:

To address the relaying protection problems of power grid with penetrations of doubly fed induction generator, fault current features of doubly fed induction generator have to be studied. In the faults of non-severe which take place far away from doubly fed induction generator, crowbar protection is not activated. In these fault circumstances, active response of converter will result in more difficult fault current characteristics of doubly fed induction

generator that are tricky to analyze. We put forward an analysis technique for fault current features of doubly fed induction generator in non severe fault conditions. At first the active response of rotor-side converter is assessed on condition that control loop of external power is shutdown and reference signals of control loop of inner rotor current are maintained stable. Afterwards the easy calculation representation of rotor fault current is recognized in relation to various principles of inner rotor current controller. Fault features regarding stator current are considered and analytical expressions of stator fault current are achieved.

REFERENCES

[1] D. F. Howard, T. G. Habetler, and R. G. Harley, "Improv:ed sequence network model of wind turbine generators for short-circuit studies," IEEE Trans. Energy Convers., vol. 27, no. 4, pp. 968–977, Dec. 2012.

[2] J. Morren and S. W. H. de Haan, "Ridethrough of wind turbines with doubly-fed induction generator during a voltage dip," IEEE Trans. Energy Convers., vol. 20, no. 2, pp. 435–441, Jun. 2005.

[3] J. Lopez, P. Sanchis, X. Roboam, and L. Marroyo, "Dynamic behaviour of the doubly-fed induction generator during three-phase voltage dips," IEEE Trans. Energy Convers., vol. 22, no. 3, pp. 709–717, Sep. 2007.

[4] X. P. Kong, Z. Zhang, X. G. Yin, and Z. X. Li, "Study on fault current of DFIG during slight fault condition," TELKOMNIKA, vol. 11, pp. 2221–2230, Apr. 2013.

[5] W. Leonhard, Control of Electrical Drives. Berlin, Germany: Springer- Verlag, 1995.

[6] C. W. Zhang and X. Zhang, PWM Rectifier and Control. Beijing, China: Machine Press, 2003, pp. 114–117.

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