



A Novel Solution for Stable and High Quality Power for Power System with high Penetration of Renewable Energy Transmission by HVDC

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A Novel Solution for Stable and High Quality Power for Power System with high Penetration of Renewable Energy Transmission by HVDC

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Abstract-In Recent days the use of renewable energy resources are generally in a increasing manner. With the development of renewable energy resources are too long from the load stations in the southeast and east side locations. Power system dynamic issues are solved in a way, the issues like damping and lack of inertia, sub synchronous oscillations caused by inter harmonics with AC-AC power conversion based Renewable energy power generators, comparing 18 HVDC transmission lines, a combined capacity of exceeding 130GW, are currently under process. A new technology is proposed in a stable way for power system with high capacity of renewable energy sources. The pair of synchronous motor-generator pair (MGP) is proposed to solve the above mentioned issues. The new expansion of generation and proposed system transmission capacities based power sources are modeled to design the characteristics of the power grid. Small signal stability of the system is varied and it can be used as a suitable damping control model. The harmonic response of MGP is analyses the electromagnetic principle. The harmonic content present in the load side is heavily eliminated. The renewable energy system characterizes power electronics and used in HVDC and the renewable power generation. By this proposed model, this clean energy greatly improves the system stability and power quality.

Keywords-HVDC Transmission, Renewable Energy, System Resonance, System Stability.

1. Introduction

The arrangement of energy sources and electricity accessible to advance the proposed system. The power system will have superior permeability in future generation of renewable energy. The total of power creation time might be equal to the power used in stability cases. The power invention of wind turbine or photovoltaic power differs from one place to another. In case of generating electricity from renewable bases provides comparatively slight portion of electricity in china. Most of the manufacturing and population are in the southeast and east part of the country. But the appropriate power in the northwest and north, long distance program is needed about 2000Km in many cases. The HVDC transmission lines are now in operation and recent days it is in the growth stage in china. After 2010 the operations were established by the popular of the transmission lines at +_500KV and at +_1100KV. The total magnitude of the lines exceeds more than 32600Km. The progress of PV and wind and HVDC transmission is giving the control characteristics of the power grid.

Power electronics is generally is a way to enable the latest technologies for both HVDC transmission and renewable power generation. For the system adjustment the characteristics of inertia and damping plays a major role. The controlling of the wind turbine model can be easily limited. More synchronous generators are replaced by suitable power components, than the level of damping and inertia is reduced in a way. The virtual synchronous generators which control the renewable energy converters to operate the system level as stability like a synchronous generator. The limit of converter and the merits of synchronous generators are discussed with motor generator pair which is a new grid connection method to drive synchronous motor and to increase the permeability. We are going for this analysis in detail. In order to study the performance of MGP. Including HVDC converters, DC circuit breakers are used. In a way for HVDC transmission. The gap between power electronics converter and grid system technologies gives a grid operation and stability of renewable energy. The non linearity and the complexity of the power power electronics system structure varies in nature. The overall operation of the rotating equipment varies and affected by harmonics. The proposed system analyses the transmission and harmonic equipment to justify the

MGP circuit and improves the stability and increases the quality of power. Several schemes are implemented to improve the grid stability and to support the future expansion of renewable energy generation.

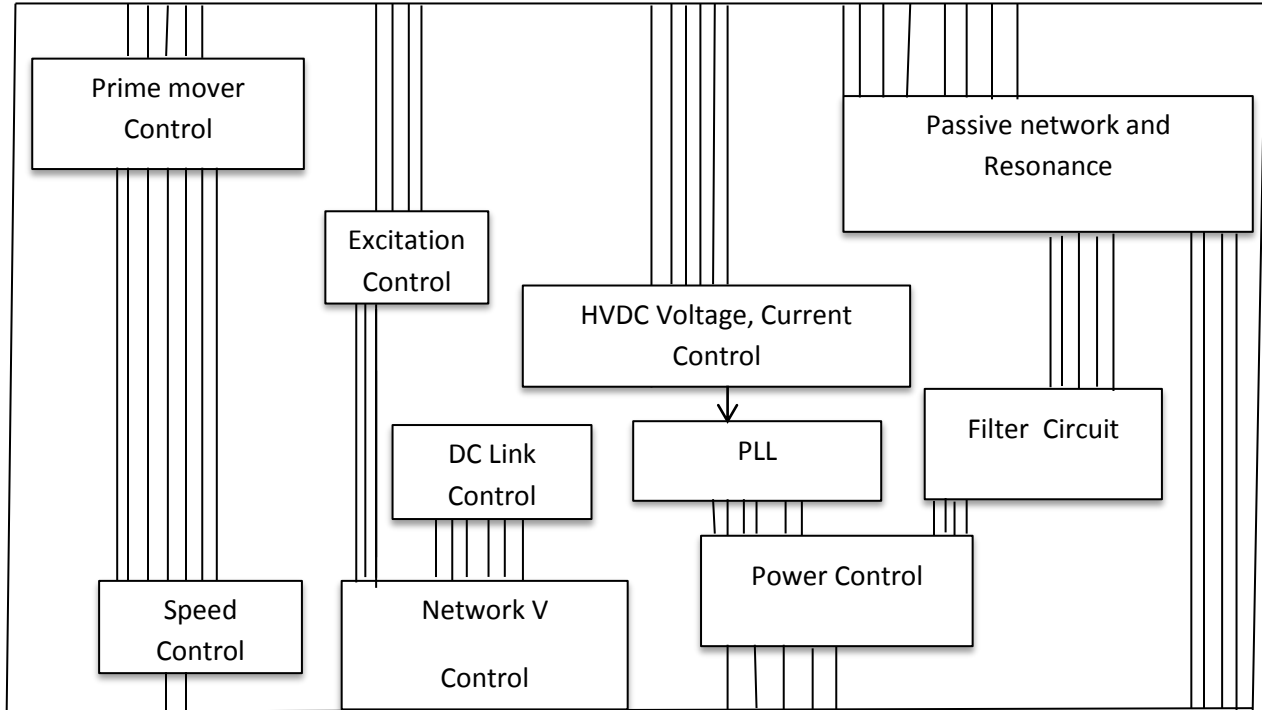


Fig.1 Power system model for Hybrid power transmission system

Motor-Generator Pair :

The figure shows the conversion of electrical and mechanical energy. The synchronous machines can provide damping level as well as inertia. Motor-Generator pair is a new model of inertia circuit. By this proposed analysis MGP set can produce efficiency level more than 94%. The production cost of synchronous generator will be lower than by comparing remaining methods to that of large power transmission.

High quality Harmonic Response of MGP:

The harmonic input currents can be measured by following way.

$$i_A = \varepsilon_{m=2} \infty I_m \cos m \omega t$$

$$i_B = \varepsilon_{m=2} \infty I_m \cos m(\omega t - 2\pi/3)$$

$$i_C = \varepsilon_{m=2} \infty I_m \cos m(\omega t + 2\pi/3)$$

The magnetic force can be generated by the motor side current rotates at synchronization. Motor generator pair output is highly stable power in the order of 100watts. The voltage level at different point also measured by the fundamental wave frequency level of 50Hz to get the normalized value.

II. Fast control and dynamics:

The advanced technology of modern power electronics circuits designed by steady state increasing operations with the improvement of advanced power semiconductor circuit topology. Switching frequency levels not only helps to increase control speed and improves the performance of the system. The control system limits the use of inductors capacitors and transformers by reducing volume, cost and weight. The frequency level in high power high voltage design is lowered by more frequency in the range of KHz is possible and normal for PV and wind stations. DC-DC motor coupled generator pair is acts as a inverter circuit. The bandwidth level of most control processors used for higher fundamental frequency as fast control complex dynamics in the synchronous level may be higher or lower i.e sub synchronous level and super synchronous levels are used. This gives a proposed stability with suitable power quality and resonance problem.

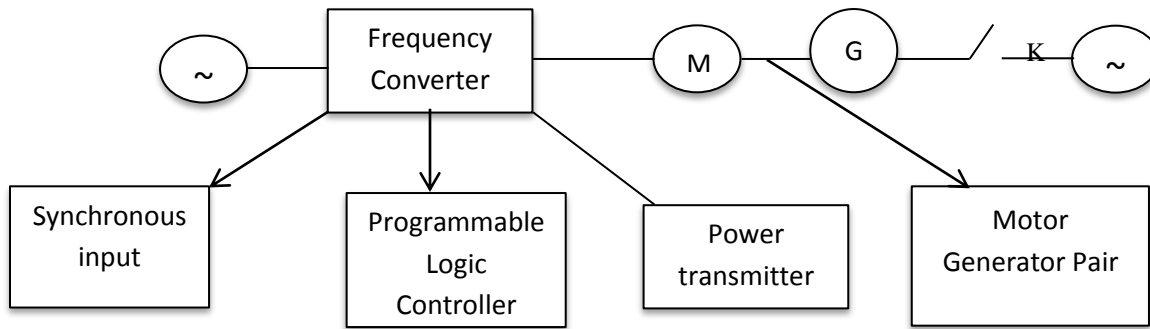


Fig2: Power transmission Equipment system

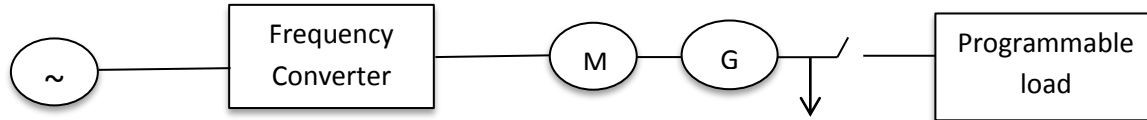


Fig 3: Power transmission Equipment system with Programmable load

III. Simulation Results

To extend the input voltage range, without affecting efficiency the following Simulink results were analyzed by MATLAB Simulink processor.

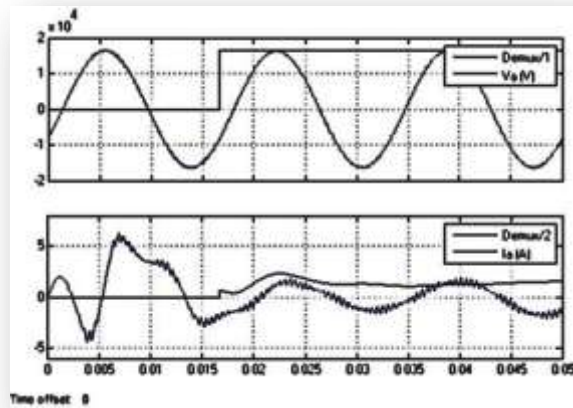


Fig.4 Grid output voltage. Here the above figure indicates the output voltage 15KV, Output current is 0.5A.

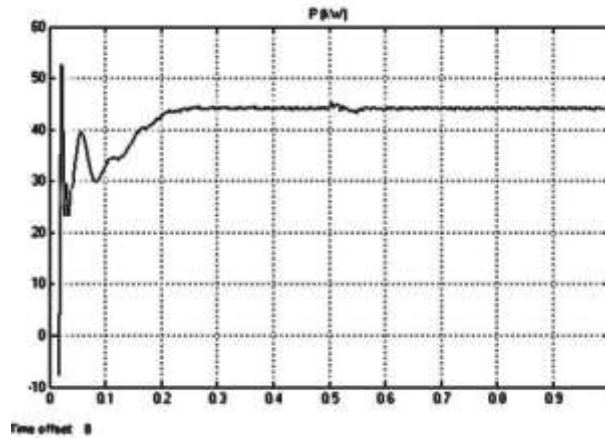


Fig.5 Output Power 45KW.

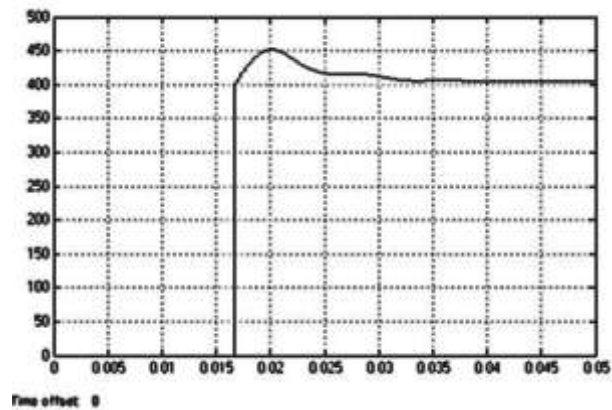


Fig.6 Photovoltaic and Wind Energy voltage=400V.

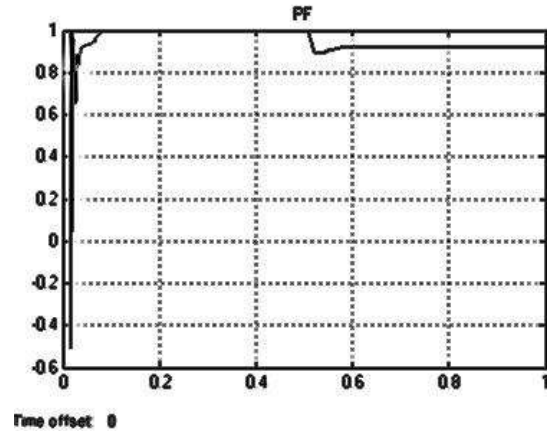


Fig.7.The developed output power factor of the proposed system is unity.

IV. Hardware Implementation of Renewable Energy Systems

The Proposed system is developed by means of 50Watts Solarix and 12V Nominal voltage. The hardware model is interfaced with arduino software and the PV, Wind Battery voltages are displayed in a software model.

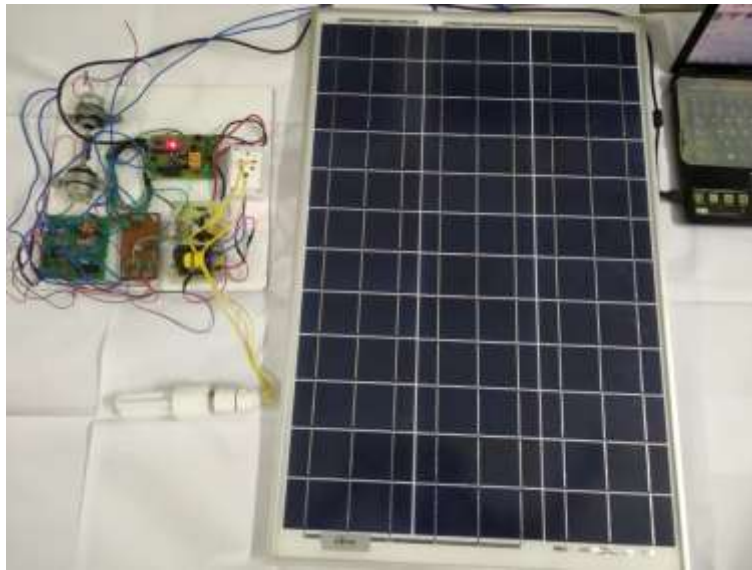


Fig.8 Implementation of PV-Wind Based Renewable energy Generation systems

V. Conclusion

A Novel technology is verified based on the theory of high quality power which is good for growing level of permeability of renewable energy. The shaft model of Motor-generator pair circuit topology is verified and designed with the stability analysis and it can be maintained at a constant level. The traditional power generation circuit proposes and the power generation unit gives a complementary power by two motors. More flexible damping control can be achieved by MGP control system. The developed Renewable energy system with PV-Wind model delivers a suitable output power for HVDC transmission. The proposed modeling of the total electromagnetic system and the output power of the Motor-Generator pair with high power quality is compared to the input power. New HVDC transmission lines are developed by the modeling of hybrid renewable systems. The review and analysis based stability theory gives a high frequency power electronics and fast control. New control methodologies will give a highly coupled converter based HVDC systems and the theories were verified.

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