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REDISTRIBUTION OF POWER UTILITIES TOWARDS THE VOIDAL PATH USING A HYBRID POWER TRANSMISSION NETWORK IN PLACE OF EXISTING NETWORKS

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ABSTRACT: Power from sunlight, wind, sea, hydropower, biomass, geothermal assets, and bio-powers and hydrogen got from renewable assets. Each of these sources has one of a kind attributes which impact how and where they are utilized. It recreates all amounts of hybrid electrical power framework. In the theses work a MATLAB model is simulated were power is recollected and seen in the form of load current from sources and than in the deficit section power is redistributed. The proposed circuit utilizes momentary p-q (genuine fanciful) control hypothesis. The Model Is Best Suited For The Complete Use Of Power Utilities By The Hybrid Power Network Model.

I. INTRODUCTION

With the continuous consumption of fossil fuels, such as oil and coal, energy shortage, environmental pollution and ecological deterioration are becoming severe day by day. Development and utilization of renewable energy is an effective way to solve the energy crisis and environmental pollution problems [1]. This type of energy generation combines the traditional hydro power with solar energy and wind energy, using the three kinds of energy's complementarities in the climate and technology. Distributed energy generation, mainly refers to the energy generating device making use of renewable energy such as wind, solar and micro-hydro power [2]. It is the complement and supplement to the external grid, continuous supply power while accident or disaster happens, make up for the deficiencies of the safe operating in the external grid, effectively achieve energy cascade utilization, improve reliability and feasibility of the system. It applies to remote areas far from the grid, and is beneficial to the ecological environment protection [3], [4]. The increasing number of renewable energy sources and distributed generators requires new strategies for their operations in order to improve the power-supply stability and quality [5]. At present, most of the researches about scheduling strategy of renewable energy are related to wind energy, solar energy and hybrid wind-solar, wind-hydro generation system. For example, [6] analyzes dynamic performance of an isolated wind and solar system with battery storage, [7], [8] proposes several methodologies for optimal design of grid-connected or isolated hybrid systems. However, research comprehensively considering wind energy, solar energy and hydropower is still rare [9], and the study about scheduling strategy and optimizing design of hybrid wind-solar-hydro power generation system has not been reported. This paper proposes energy scheduling strategy for the hybrid system, optimizing the power flow, reducing system operating costs and guaranteeing system stability at the same time. The model of hybrid wind-solar-hydro power generation system is built. Combined with the scheduling strategy and the optimization model, the simulated model displays the optimal solution in specific examples. Simulation result demonstrates the effectiveness and advantages of the proposed strategy.

II. PV/HEPS SYSTEM

Wind-Turbine Subsystem

The wind turbine is the mechanical device that turns wind's kinetic energy into mechanical energy. The size of output power depends on wind speed [10]. Experiments show that the relationship between output power and wind speed as follows:

$$P_t = \begin{cases} 0 & 0 \le V < V_{ci}, V \ge V_{co} \\ f(V) & V_{ci} \le V < V_R \\ P_R & V_R \le V < V_{co} \end{cases} \quad (1)$$

where R P is the rated power of wind turbine f (V) can be linear, quadratic and cubic functions.

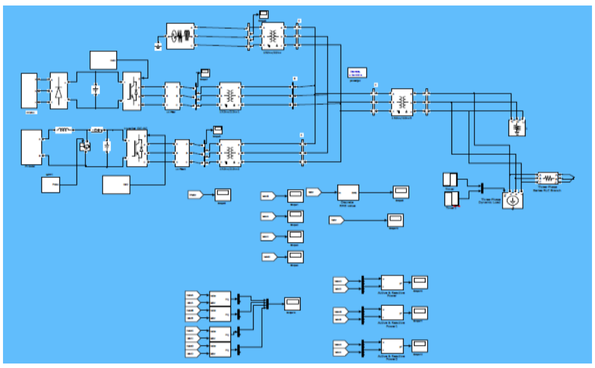
Photovoltaic Subsystem

Photovoltaic is the static device that converts solar energy into electricity in the form of direct current. The power output depends on solar radiation and temperature conditions [10].

The output power of photovoltaic can be written as:

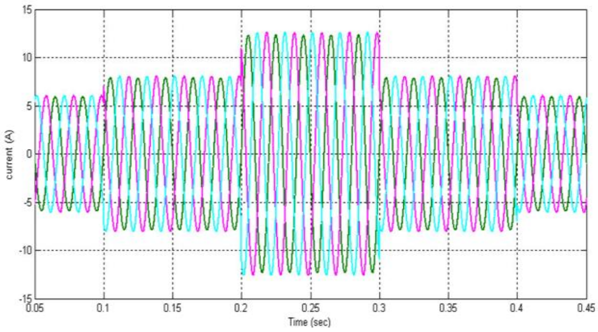
$$P_{PV} = f_{PV} Y_{PV} \left(\frac{I_T}{I_S} \right) \quad (2)$$

III. SIMULATION MODEL & RESULT ANALYSIS

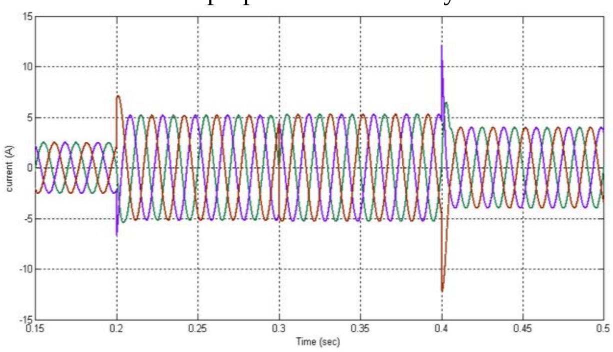


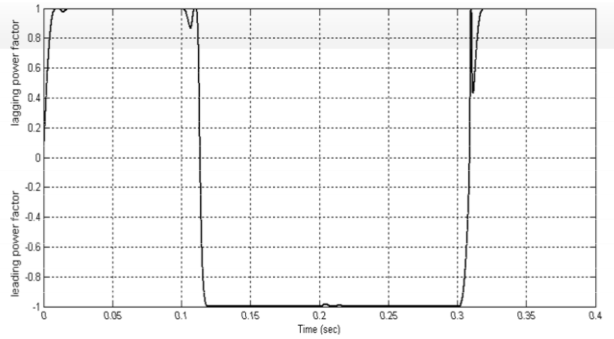
- The total power load level is 500 kW with 721.68A per phase load current for duration 0.2 sec. After 0.2sec the load has been changed from 500 kW to 900 kW with 1299.03A per phase load current for duration from 0.2sec to 0.4sec. Finally the load is suddenly changed to 500 kW with 721.68A per phase load current for duration from 0.4 to 0.5sec.

- The design and manufacture of highly reliable equipment made integration of HEPS easier nowadays. PV/HYDRO HEPS interface with EU for solving power crisis problems are simulated by using Matlab/Simulink environment. The control circuit for the converter for all radiation and hydraulic turbine speed has been successfully simulated.
- The proposed model has a purely sinusoidal controlled ideal voltage source at the inverter terminals. Due to the small width of the hysteresis band the voltage generated by the proposed model is nearly sinusoidal when seen at this bus.
- Figure 3 shows the inverter line current injected by the WTG in the side (B) with total harmonic distortion 1.4 % on the other hand Fig. 4 shows the inverter line current injected by the PV system in the side (A) with total harmonic distortion 3.4 %. The load line current of the load demand in the side (C) is shown in Fig. 6.
- From Fig. 3 it can be seen that there is a surplus power in the period from 0.1 sec to 0.3 sec., so the surplus power will be injected to the EU for this period. On the other hand, there is a deficit power in the period of 0.1 sec. and in the period from 0.3 to 0.5 sec. So, the EU will supply the load demand in cooperated with hybrid PV/WTG for these periods.



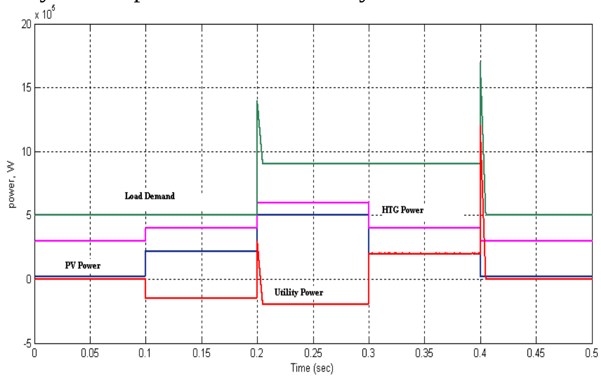
These can be seen in Fig. 5 and Fig. 7, where Fig. 5 shows the simulated of grid line current in the side (D) with total harmonic distortion of 2.33% that injected to or drawn from grid and Fig. 7 displays the simulated power factor of the grid. Also, from this Figures 5 and 7 it can be seen that the power factor is leading in the period of surplus power and lagging in the period of the deficit power. From these figures it can be seen that the proposed model is very excellent.





The total harmonic distortion (THD) at the local bus is within acceptable limits and reached to 0.14% for the inverter current from HTG, 0.15% for the inverter current from PV and 0.20% for the grid current.

Also the submerged curve is drawn for the complete hybrid system that how properly the power is managed in the deficit and surplus conditions. The line in the red shows the power matching with green colored load demand without hybrid system and the line with pink color shows the matching with green colored load demand, from both the points it is clearly observed that hybrid system matches with load demand more closely as compared to the normal system.



IV. CONCLUSION

PV cell, module and array are simulated and effect of environmental conditions on their characteristics is studied Wind energy system has been studied and simulated Maximum power point of operation is tracked for both the systems using P&O algorithm. Both the systems are integrated and the hybrid system is used for battery charging and discharging

FUTURE WORK

MPP can be tracked using different algorithms

Battery charge controller can be designed for more reliable operation and better battery life

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