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SUPERVISORY PREDICTIVE CONTROL OF STANDALONE WIND/SOLAR ENERGY GENERATION SYSTEMS

Katkar Rani A.
Department of Electrical Engg.
SBPCOE Indapur.

Bhosale Nutan V.
Department of Electrical Engg.
SBPCOE Indapur.

Bhange Dhyneshwar S.
Department of Electrical Engg.
SBPCOE Indapur.

Prof. Phutane P. S
Guide- Department of Electrical Engg.
SBPCOE Indapur.

ABSTRACT

This paper presents a supervisory model predictive control method for the optimal management and operation of hybrid standalone wind-solar energy generation. This work present supervisory control system through model predictive control which calculates the power references for the wind and solar subsystems at each sampling time while minimizing a suitable cost function. In this paper we discuss how to extend the life time of the equipment by reducing the peak values of inrush or surge currents, into the formulation of the model predictive control optimization problem. We present several simulation of this system.

KEW WORDS:-Model predictive control (MPC), solar energy, standalone wind and solar systems, supervisory predictive control of wind energy.

INTRODUCTION

Renewable energy sources like a wind-solar energy generation system in solar-wind generation system main advantages Use the green and inexhaustible energy from sun and wind, free from smoke and pollution. Potential grid expansion deferral due to the possibility of generation closes to demand. In the hybrid power system, such as the system which combines the solar and wind power system, a supervisory control is needed to satisfy the load demand for all atmospheric conditions [The control system determines the operation modes of the wind and solar systems in order to manage the energy balance between the total generation power and the total demand (load power and power to charge battery).

They developed a supervisory predictive control for optimizing the operation of hybrid wind-solar power systems. The model predictive control (MPC) is employed to compute the power references for the wind and solar subsystems while minimizing a cost function. Renewable energy resources are

the ones that are persistently available and renewing itself with the time. Industrialization and increasing world population has remarked the use of renewable energy resources. Solar power, wind power, biomass, tide power, wave power, geothermal power is known ones.

Hybrid Wind-Solar System for the rural exchanges can make an ideal alternative in areas where wind velocity of 5-6 m/s is available. Solar-wind power generations are clear and non-polluting. Also they complement each other. During the period of bright sunlight the solar energy is utilized for charging the batteries, creating enough energy reserve to be drawn during night, while the wind turbine produce most of the energy during monsoon when solar power generation is minimum.

MODEL PREDICTIVE CONTROL:-

In this method we use Model Predictive Control (MPC) is a is an optimal control strategy based on numerical optimization. Future control inputs and future plant responses are predicted using a system model and optimized at regular intervals with respect to a performance index. From its origins as a computational technique for improving control performance in applications within the process and petrochemical industries, predictive control has become arguably the most wide spread advanced control methodology currently in use in industry. MPC has a sound theoretical basis and its stability, optimality, and robustness properties are well understood.

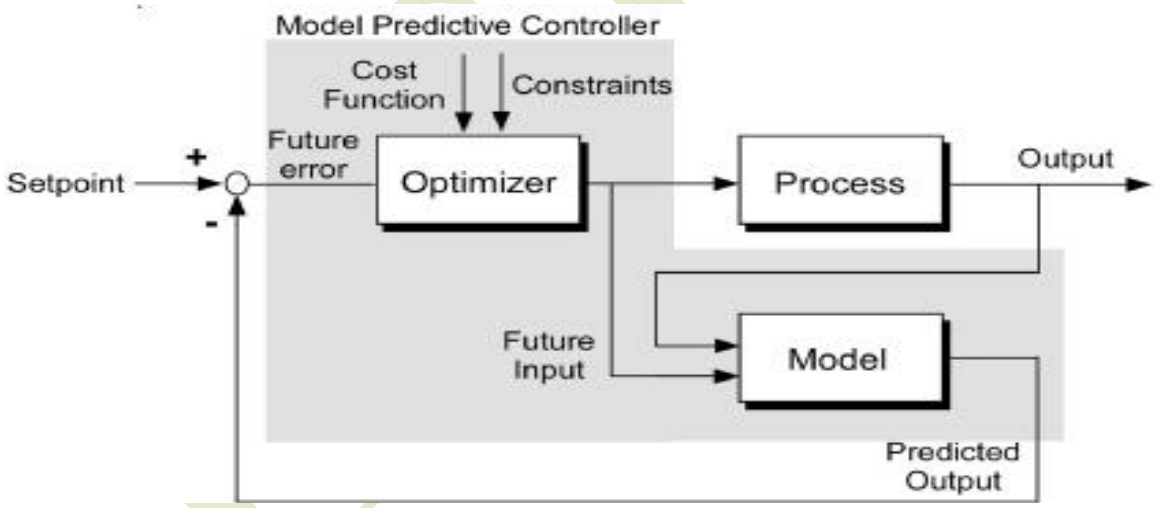


Fig :- MPC

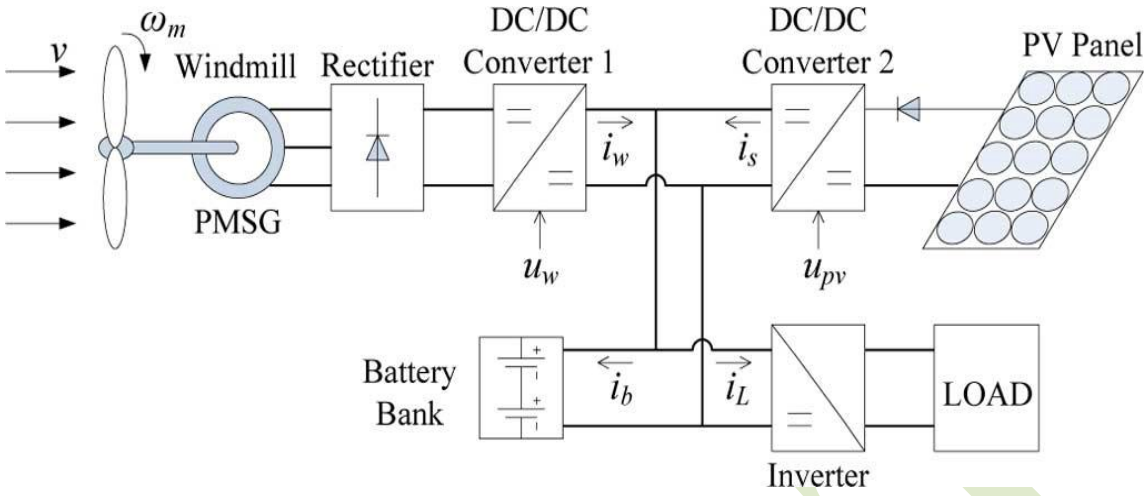


Fig. 1. Wind-solar energy generation system

In MPC is very simple to design and implement, MPC algorithms can controlLarge scale systems with many control variables and most importantly MPC provides a systematic method of dealing with constraints on inputs and states.
In this work we discuss how we can incorporate practical considerations:

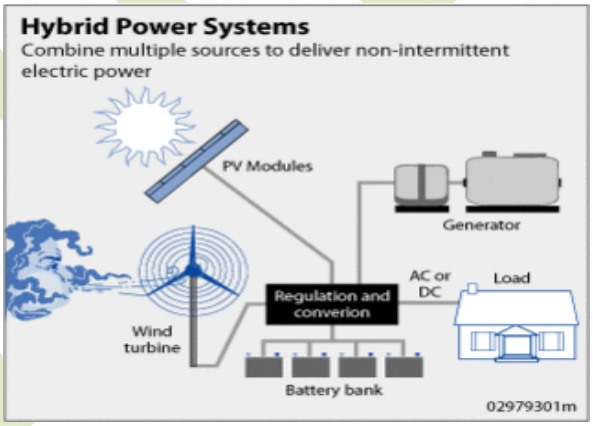
WIND-SOLAR SYSTEM DESCRIPTION

In this system there are three systems are used wind system solar system and lead acid system.
First we describe the solar generation system

In India the annual global solar radiation is about 5 KWh/ sq. per day with about 2300-3200 sun-shine hours per year. Solar radiations represent the earth's most abundant energy source. The perennial source of solar energy provides unlimited supply, has no negative impact on the environment. The solar photovoltaic (PV) modules convert solar radiation from the sun into electrical energy in the form of direct current (DC). Converting solar energy into electricity is the answer to the mounting power problems in the rural areas. Its suitability for environment-friendly nature makes it an attractive option to decentralized applications and its supplement the energy supply from other sources. electricity is the answer to the mounting power problems in the rural areas. Its suitability for decentralized applications and its environment-friendly nature make it an attractive option to supplement the energy supply from other sources.

STANDALONE SYSTEM

Standalone system is also known as remote area power supply system is the off the-grid electricity system for locations that are not fitted with an electricity distribution system.



In standalone system there are two method are used electricity generator, energy storage and regulation

ADVANTAGE

- Clean and green energy source that can reduce green house gases
- Highly reliable and needs minimal maintenance
- Costs little to build and operate
- Almost has no environmental polluting impact
- Modular and flexible in terms of size, ratings and applications

CONCLUSION

In this paper of a supervisory predictive control method for the optimal management and operation of hybrid wind-solar energy generation systems. by using of model predictive control which computes the power references for the wind and solar subsystems at each sampling time while minimizing a suitable cost function.

FUTURE SCOPE

- Designed to for easy to operate, servicing and maintains where required
- Most eco friendly and clean source of power
- No pollutions and no recurring fuel cost.
- Increasing public safety and aids in providing a safe working environment in areas when main power risky

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