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Novel UPFC-based line overload control using Honeybee Algorithm

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Abstract:

Unified Power Flow Controller(UPFC) is Shunt-Series type device that posses all capabilities to control real, reactive power, voltage and reactance of the connected line in the power system. Honey Bee algorithm is the new intelligent algorithm used for all complex engineering optimization problem power system has many complex optimization problems one of which is the Optimal Power Flow(OPF). Basically it is minimizing optimization problem and subjected to many complex objective functions and constraints. Hence Honey Bee Algorithm is used to solve Optimal Power Flow (OPF) and overload in transmission line in this paper.

I. Introduction:

Power quality is one of major concerns in the present era. According to Survey results it shows that 92% of interruption industrial facilities are caused due to voltage sag related. The UPFC(UPFC) is a series connected device whose function is to protect a sensitive industrial load from voltage sags. The voltage sag compensator, based on a transformer-coupled is connected in series to voltage source inverter, is among the most cost effective solution

against voltage sags. To mitigate the problems caused by poor quality of power supply, series compensators are used. Transformers are often installed in front of critical loads for electrical isolation purposes. When voltage sags happen, the transformers are exposed to the disfigured voltages and a DC offset will occur in its flux linkage. When the compensator restores the load voltage, the flux linkage will be driven to the level of magnetic saturation and severe inrush current occurs. The compensator is likely to be interrupted because of its own over-current protection, and eventually the compensation fails, and the critical loads are interrupted by the voltage sag. This paper proposes an improvement of transient current response using inrush current mitigation technique of load transformer together with a state feedback controller for the voltage sag compensator. The operation principles of the proposed method are specifically presented, and experiments are provided validate the proposed approach

Objective:

To study the effect of voltage sags and swells on the performance of light power industrial equipment and to reduce the reactive power.

Existing system:

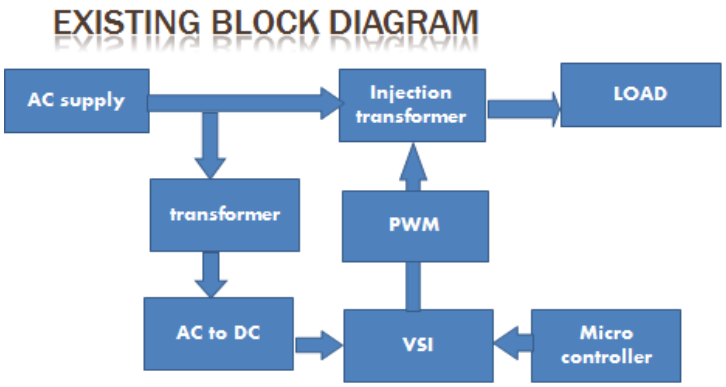
- In existing method DC-link source is from the grid supply when the fault occurs the DC-link voltage alsovaries so sag injection voltage is not stable.
- If DC-link voltage not stable means response time for voltage sag reduction is high.
- Due to instability of DC-link voltage harmonics level is high in ac-grid system.

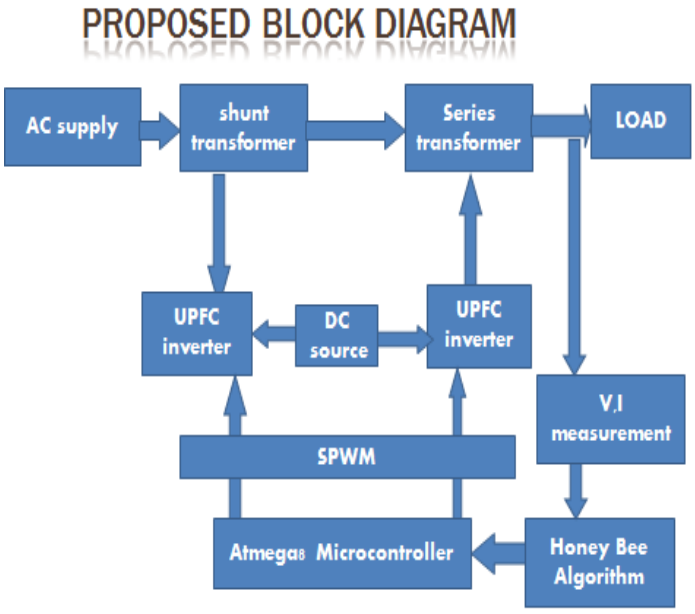
Disadvantage:

- Sag and swell only compensated.
- Transient time for sag rectification is of 10ms to 1 minute.
- Compensating voltage source is used from same transmission line so power losses is high.

Proposed system:

- Transient stability time of sag rectification is less than 1ms.
- Compensation voltage source is used separate dc source or we can implement any renewable energy sources .
- Due to implementation of Honey bee algorithm compensation is very fast.
- In our proposed system we implementing pv source for UPFC, so DC-link voltage is stable
- Voltage sag reduction response time is low.





Transformer:

A transformer is an electro-magnetic static device, which transfers electrical energy from one circuit to another, either at the same voltage or at different voltage but at the same frequency.

Rectifier:

The function of the rectifier is to convert AC to DC current or voltage. Usually in the rectifier circuit full wave bridge rectifier is used.

Filter:

The Filter is used to remove the pulsated AC. A filter circuit uses capacitor and inductor. The function of the capacitor is to block the DC voltage and bypass the AC voltage. The function of the inductor is to block the AC voltage and bypass the DC voltage.

Voltage Regulator:

Voltage regulator constitutes an indispensable part of the power supply section of any electronic systems. The main advantage of the regulator ICs is that it regulates or maintains the output constant, in spite of the variation in the input supply.

Voltage Regulation

Two basic categories of voltage regulation are:

- **line regulation**
- **load regulation**

- **The purpose of line regulation is to maintain a nearly constant output voltage when the input voltage varies.**
- **The purpose of load regulation is to maintain a nearly constant output voltage when the load variesLine Regulation**
- **Special Microcontroller Features**
- Power-on Reset and Programmable Brown-out Detection
- Internal Calibrated RC Oscillator
- External and Internal Interrupt Sources
- Five Sleep Modes: Idle, ADC Noise Reduction, Power-save
- **•I/O and Packages**
- 23 Programmable I/O Lines
- 28-lead PDIP, 32-lead TQFP, and 32-pad QFN/MLF
- **Operating Voltages**
- 2.7 - 5.5V (ATmega8L)
- 4.5 - 5.5V (ATmega8)
- **Power Consumption at 4 Mhz, 3V, 25°C**
- Active: 3.6 mA
- Idle Mode: 1.0 mA
- Power-down Mode: 0.5 µA

Conclusions :

Honey bee algorithm is implemented to solve OPF with UPFC. This algorithm is used for the both FACTS device to prove the performance of the UPFC. The losses and prime objective of cost minimization of OPF problem are minimized very well when UPFC is included in the system.

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