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## TO AUGMENT THE POWER SYSTEM CONSTANCY BY USING STATIC SYNCHRONOUS SERIES COMPENSATOR

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**ABSTRACT:** *The non-stop call for in electric powered power gadget community has caused the device to be closely loaded main to machine instability. Under the faulty situations energy tool observes transients (oscillations) with critical modifications in active and reactive energy float. To compensate those transients, within the secure time and additionally to improve active and reactive electricity glide numerous compensation methods like the use of FACTS controller are utilized in power system. The energy device industry is a subject wherein there are regular changes takes place. Economic and environmental pressures force electric powered organizations to enhance the energy switch functionality of the present transmission traces in location of constructing new ones. Besides allowing a higher utilization of current energy structures capability, FACTS controllers can manipulate community parameters, together with price of sending-stop and receiving-give up voltage, and active-reactive energy, to improve each the brief stability normal overall performance of the system. In thesis paintings describe the Static synchronous collection compensator device, that controls the power waft of the transmission line for the duration of sever disturbances. Basics of Static synchronous collection compensator are that it does not includes bulky problem like reactor and inductor so this tool is more inside your manner evaluate to standard devices.*

**Keywords:** *Voltage, strategy, boost, buck converters, comparison, voltage ripple, fault voltage.*

### 1. INTRODUCTION:

Nowadays, the need for bendy and fast electricity go with the flow control within the transmission device is expected to boom inside the destiny in view of software deregulation and electricity wheeling requirement. The utilities need to function their energy transmission gadget lots more efficiently, increasing their utilization degree. Reducing the effective reactance of strains by collection compensation is a direct method to boom transmission capability. However, power transfer functionality of long transmission lines is limited by way of balance concerns. Because of the strength virtual switching capabilities in phrases of manipulate and high velocity, greater blessings were finished in FACTS gadgets regions and presence of these devices in quick balance in some unspecified time in the future of transient faults ensuing in improvement in power machine balance. A Static Synchronous Series Compensator (SSSC) is a member of FACTS own family it really is associated in collection with a strength gadget. It includes a strong kingdom voltage source converter (VSC) which generates a controllable alternating contemporary voltage at fundamental frequency. When the injected voltage is Kept in quadrature with the road present day, it may emulate as inductive or capacitive reactance in order to steer the electricity drift thru the transmission line. While the primary reason of a SSSC is to manipulate energy glide in regular country, it may also improve transient balance of a energy system. Now presently in power machine all areas are related with every other which we known as interconnected electricity gadget. Electric strength device is mixture in which turbines, transmission and distribution facilities and electrical masses detail are related to every different regularly. Such due to huge machine is one-of-a-kind kinds of disturbances produced which may also reason undesirable or useless results on the network, which incorporates blackouts or lack of synchronism in turbines. Evaluation of brief balance hunts down the behaviour of a power machine for as lots as extra seconds following a energy disturbance. SSSC has been used at in series the transmission line for damping and repayment for the improvement inside the power transfer capability.

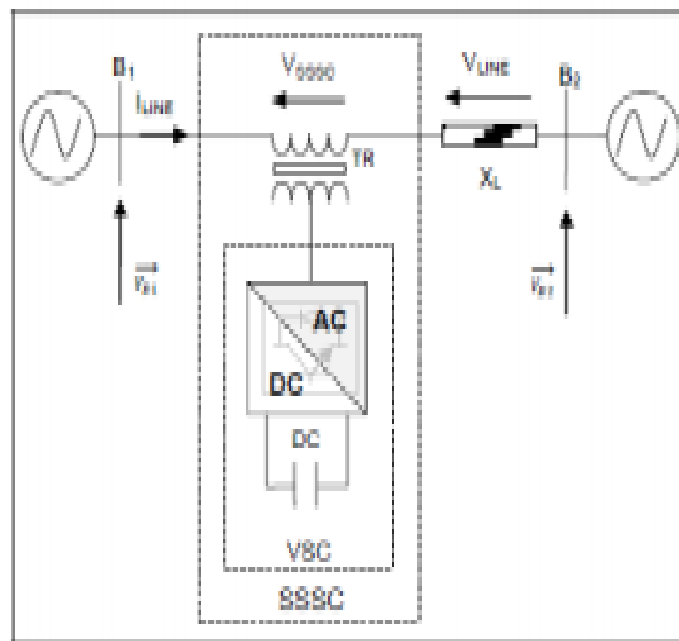
### 2. RELATED STUDY:

A static synchronous generator is a series compensator whose output voltage is in quadrature with, and controllable independently of, the line modern for the cause of increasing or reducing the general reactive voltage drop across the road and thereby controlling the transmitted power. When the section distinction among voltage to the modern is  $-900$  or voltage lags the road present day by means of  $900$ , it'll behaves as a sequence capacitor and , phase distinction between them is  $+900$  or voltage leads the road current by  $900$  ,it behaves as a series inductor. The Fig.1 suggests a purposeful model of the SSSC where the dc capacitor has been replaced by way of an power storage device to permit energetic in addition to reactive electricity exchanges with the ac gadget. SSSC include a stable nation voltage supply converter (VSC) which generates a controllable AC voltage at fundamental frequency and is attached in collection with transmission line. FACTS can improve the steadiness of community, inclusive of the transient and the small signal stability, and may lessen the drift of heavily loaded lines and guide voltages through controlling their parameters which include collection impedance, shunt impedance, contemporary, and voltage and segment perspective. Controlling the

strength flows inside the network leads to lessen the flow of heavily loaded traces, increased device load capability, less system loss and improved safety of the system. It consists of a stable kingdom voltage source converter (VSC) which generates a controllable alternating cutting-edge voltage at essential frequency. When the injected voltage is stored in quadrature with the line cutting-edge, it may emulate as inductive or capacitive reactance so as to persuade the electricity glide via the transmission line. While the number one purpose of a SSSC is to govern electricity go with the flow in constant country, it is able to also improve temporary stability of an energy gadget. Here PI controller is used to govern the parameters of the electricity system. The static synchronous collection compensator (SSSC) is a series device of the Flexible AC Transmission Systems (FACTS) circles of relatives the usage of power electronics to control electricity glides and improve transient stability on electricity grids. The SSSC regulates voltage at its terminals by means of controlling the quantity of reactive energy injected into or absorbed from the energy machine. Here in this paper a brand new easy concept is delivered with simultaneous operation of two machine gadget with SSSC converter. The SSSC is connected at bus-3 of the transmission line. The -device strength machine is simulated the usage of MATLAB and the effect of with and without SSSC on gadget and in fault situation are simulated.

### 3. AN OVERVIEW OF PROPOSED SYSTEM:

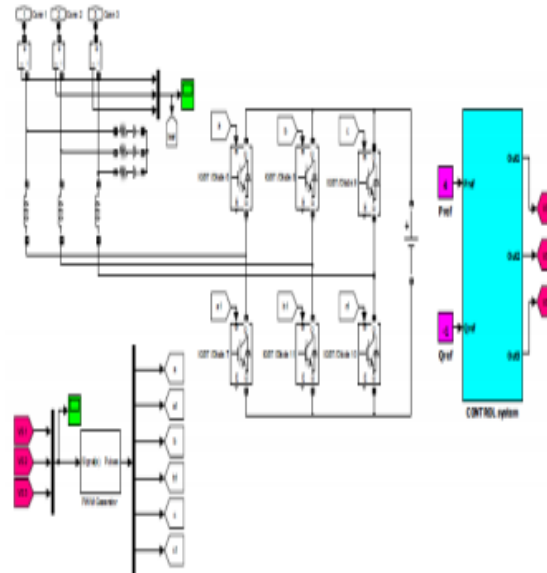
The coronary heart of SSSC is a VSI (voltage deliver inverter) that is provided thru a DC storage capacitor. With no external DC link, the injected voltage has parts. The principal factor is in quadrature with the road present day and emulates an inductive or capacitive reactance in series with the transmission line, and a small a part of the injected voltage is in section with the road modern to cover the losses of the inverter. When the injected voltage is major the street present day, it'll emulate a capacitive reactance in collection with the road, inflicting the street current similarly to strength waft through the road to growth. When the injected voltage is lagging the road cutting-edge, it'll emulate an inductive reactance in series with the line, causing the line Current in addition to electricity glide thru the road to decrease. A series capacitor compensates the transmission-line inductance through presenting a lagging quadrature voltage with appreciate to the transmission-line current. This voltage acts in opposition to the leading quadrature voltage performing across the transmission line inductance, which has a internet effect of lowering the road inductance. Similar is the operation of an SSSC that also injects a quadrature voltage,  $V_c$  proportion to the street present day but is lagging in section. The discern 1 beneath shows the schematic diagram of Static Synchronous Series Compensator.



**Fig.3.1. Proposed system diagram.**

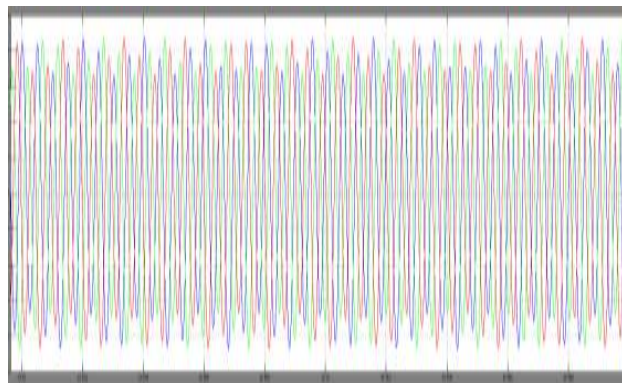
### 4. EXPERIMENTAL RESULTS

Depending upon the tool situations and the masses moving into/getting out, the injected voltage and current to the circuit are modified so in this way SSSC resembles variable reactance. The series converter of SSSC is tested in fig. Which is utilized by SSSC an awesome manner to reply to the dynamic and brief changes created in tool? The system includes producing machines alongside transmission line and load as established in decide. The compensator is supplied with a DC voltage supply which allows in feeding or absorbing the lively and reactive strength from the tool.



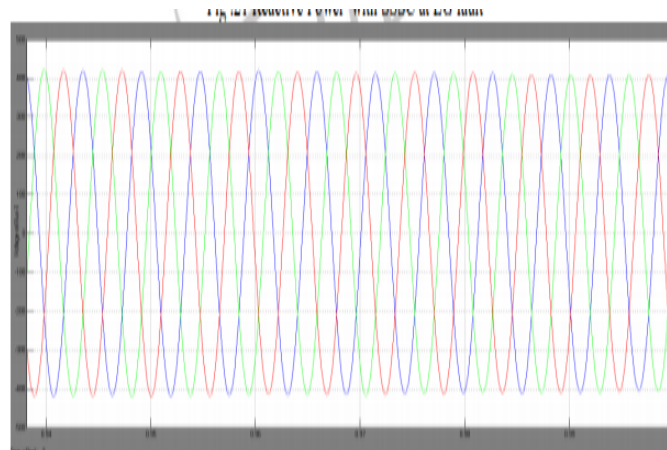
**Fig.4.1.Simulation diagram.**

After the set up of SSSC, except controlling the Power glide in bus-2 we want to preserve constant the voltage cost in 1 in keeping with unit, hence the power go with the flow is performed in the presence of SSSC and the simulation outcomes are as follows. According to the Fig, through putting in the SSSC, energetic energy damping time might be less than the mode without SSSC and it will be damped faster. Also as proven in Fig, reactive strength damping time can be reduced and system will follow the references price with acceptable error.

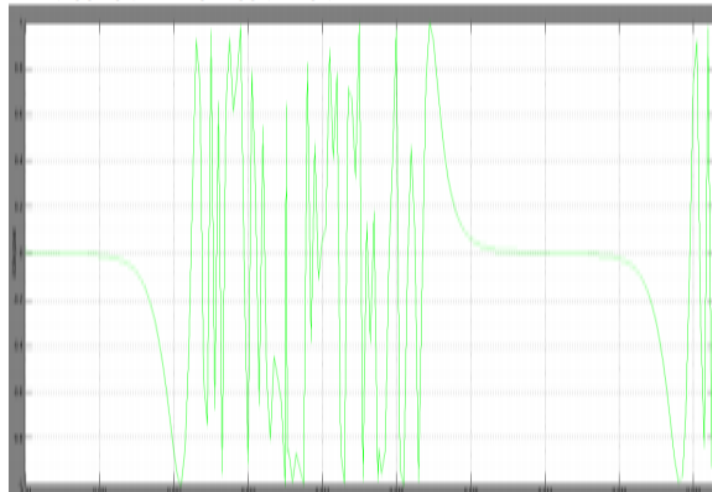


**Fig.4.2.Simulation results.**

The reactive power damping time is decreased compared to system without SSSC. Fig. 4 and fig. 3 shows the voltage and current waveform are sinusoidal and hence disturbance removed.



**Fig.4.3. Voltage at Bus-3 with SSSC at LG fault.**



**Fig.4.4. Active power at fault condition.**

### **5. CONCLUSION:**

From simulation effects we see that active energy damping time is greater for machine with out SSSC in comparison to device with SSSC. System in fault scenario moreover suggests that in fault situation energetic power oscillation are damped out faster with SSSC in system in comparison to without SSSC. Reactive electricity oscillation time is also more for gadget without SSSC in comparison to device with SSSC. Same as in fault situation for reactive electricity oscillation is damping time is a lot much less for tool with SSSC in assessment to device without SSSC. Simulation effects for machine without SSSC voltage and present day at favoured thing personal greater oscillation disturbance in waveform and simply non sinusoidal waveform we get. But by using way of connecting machine with SSSC voltage and modern-day wave shape oscillation are damped out and wave shape are nearly sinusoidal. So from simulation results we finish that transient disturbance in gadget the usage of SSSC consequently with the aid of damping energy machine oscillation in machine tool's transient stability is stepped forward. In destiny it needs to be prolonged to complex transmission device. Location of SSSC wants to be optimized for network via further research of gadget.

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