

Reactive Power Compensation Techniques In Transmission Lines

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Abstract- This paper includes the possibility of responsive power pay advancements. By techniques for responsive power compensation strategies, open power is controlled with the goal that the execution of electric energy of the system will be improved. This paper tell the brief concept with respect to the benchmarks of movement, structure properties of various types of VAR compensators, etc. These compensation techniques are used to change the execution of Alternating Current transmission and dissemination structures as per the requirement. VAR compensators redesign robustness of the AC structure by extending the most extraordinary unique power that can be transmitted. By controlling the line responsive power, the mechanism of all things considered electrical energy system will be updated. For circumstance contemplate, in the wake of executing plan and shunt techniques in the structure, results are showed up for examination

Keywords- Responsive power, Alternating Current transmission, Shunt and Series compensation

I. INTRODUCTION

Reactive power compensation helps to control the responsive ability for redesign the execution of Alternating Current system. The basic functions are:

A. Load Compensation– Here purpose of weight compensation is enable the ability to factor for the systems , to help the authentic power take from the structure, to reimburse voltage rule and removing current errors.

B. Voltage Support– Here purpose of voltage supporting is to diminish voltage assortments at a given end of the transmission line.

II. NEED OF REACTIVE POWER COMPENSATION

To explain its fundamental behind responsive power pay in the framework is;

- a) Regulating voltage.
- b) Increasing framework dependability.

- c) Advance use of the machines associated with the framework.
- d) Reduction in misfortunes related with the framework.

III. TECHNIQUE FOR REACTIVE POWER SHUNT COMPENSATION

a) SHUNT COMPENSATION—

This device related in parallel with transmission line. The shunt compensation is continually related to the midst with transmission line close by present source, voltage source , etc or by a capacitor.

It help to supply responsive ability to system. The condition of voltage is given as:

$$P + jQ = -j4V^2(1-\cos\delta/2)/x$$

here the certifiable bit of the power is zero, as such the reactive energy in the structure is incorporated by shunt compensation.

Shunt-related reactor is related to the structure for controlling the open energy. through consumption the responsive energy shunt related to reactor decreasing over excited voltages in the transmission line.

Here capacitor are related to parallel through transmission

lines are more over helps to coordinate the voltage levelled by control of the responsive ability in the transmission system lines.

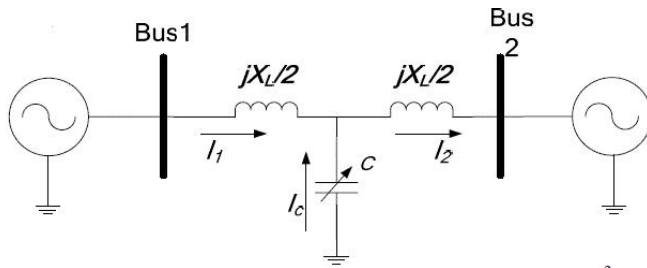


Fig A: shunt compensation through Transmission line

b) SERIES COMPENSATION--

This contraption are related in game plan of the transmission system line. Therefore it is known as a course of action compensation. There will be some techniques for movement capacitive strategy for action & inductive strategy for action.

- A revamped model for the transmission system through plan compensator is showed up in the Fig A.
- The size voltage for the two transports is

Acknowledge proportional as V, & the stage edge between them will be δ .

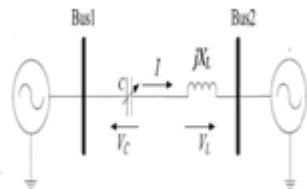


Figure B: Series Compensation through Transmission line

c) STATIC VAR COMPENSATORS --

The compensation is related in game plan with transmission system line. Therefore it is known as course of action compensation. There will be two techniques for movement i.e capacitive strategy for action and inductive strategy for action.

A reworked model for the transmission system lines with plan compensator is showed up in Figure B .The sizes of voltage of two transport is acknowledged proportional as V & the edge stage between them will be δ .

- Thyristor switched capacitor

- Thyristor switched reactor & Thyristor controlled

This device is to related in course of action with system transmission line Therefore it is known as game plan compensation. There will be two strategies for movement i.e capacitive and inductive strategy for action.

The patched up model for transmission structure with strategy remuneration will be appeared in Figure B. The sizes of voltage of the two transports is recognized equivalent to V & the stage edge between them will be δ .

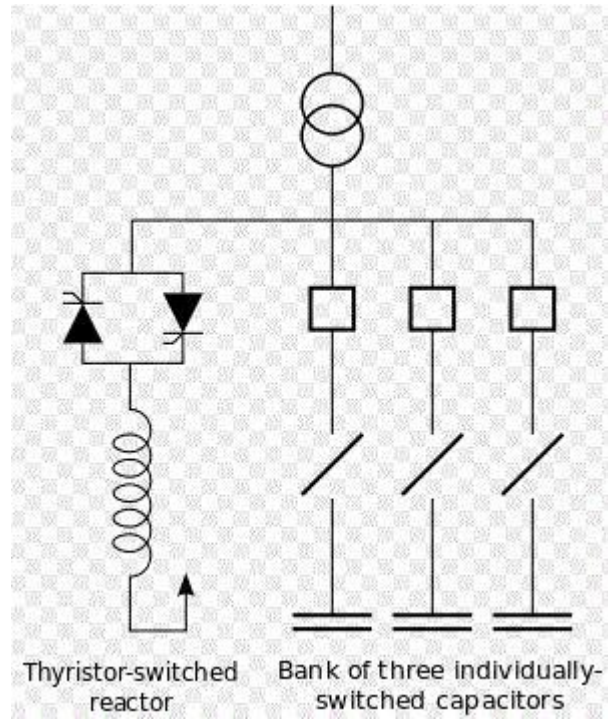


Figure C: Thyristor switched reactor

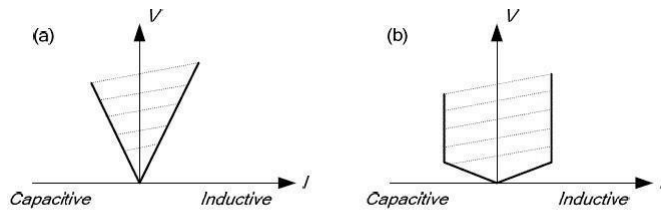
d) SELF COMMUTATED VAR COMPENSATOR--

They contain traded valve contraptions, for instance, IGBTs(Insulated Gate Bipolar Transistors) and GTOs (Gate turn-off thyristor) , united power stream controllers, Static synchronous compensators, etc chip away at standard of the self commutated VAR compensation. It can deliver or ingest open energy as need to the systems.

.e) STATIC SYNCHRONOUS COMPENSATOR --

This is person from facts gathering of the devices. This is an overseeing contraption used for pivoting stream control transmissions mastermind. This relies upon energy equipment voltage source converters & it go about as source or sink of open Alternating Current ability to power organize. The static synchronous compensator is the voltage source

converter which is based on contraction with voltage source behind a reactor. Here the example when the terminal voltage of voltage source converters will be higher than Alternating Current voltage.



V-I characteristics of SVC and STATCOM: (a) SVC; (b) STATCOM

Figure D: VI characteristics of SVC and STATCOM

f) SYNCHRONOUS CONDENSER--

It is a synchronous machine which continues running without prime mover or a mechanical weight and connected with improve the power factor of the electrical structure. In case the field excitation of synchronous condenser is controlled it can make or hold open power. When they are over-stimulated they supply responsive power and when under-empowered they ingest open power. Right when the responsive power is given by synchronous condenser current in the system is diminished. As needs be the disasters get lessened and it gives a predominant efficiency. In light of this tremendous proportion of power can be passed on to the pile.

IV. CONCEPT OF FACTS DEVICES

A power electronics based framework & different static hardwares that provide control of minimum one Alternating Current transmission framework parameter. As new innovation for power transmission framework, Certainties and Flexible AC transmission system controllers not only provide indistinguishable merits from ordinary compensations through precisely control switch in unflinching states yet additional improve in the dynamic & transient perform of the energy system. The power tools based switching in the used squares of Flexible AC transmission system can be more use than not be working over again and exchanged time is little of an occasional cycle, that is a much smaller than the traditional mechanical switches.

V. CONCLUSION

Here we see that receptive intensity of framework will be remunerated through utilizing the static synchronous compensator otherwise utilizing the Flexible AC transmission system gadgets, for example through utilizing the upper pay procedures streams of responsive energy and the energy

factor of framework can be kept up by solidarity control factors and subsequently framework will be kept up at offset conditions for the best possible greatness of the voltages compensation. Under energy burden conditions, the level voltages profiled is accomplished through inductive shunt remuneration.

Under overwhelming burden condition, a level voltage will be accomplished through including shunt capacitive remuneration.

Arrangement capacitive remuneration will hypothetically be utilized rather than shunt pay to provide a level voltage profiled, below overwhelming stacking. As for all intents and purposes, lumped arrangement capacitor will not be reasonable for getting the finished voltage profiled with the line. Therefore, clearly we get stage an adjustment in voltage happens at focuses where the arrangement capacitors are connected. Be that as it may, with utilization of arrangement capacitors improved voltage guideline anytime can be gotten.