

# Review on the Optimization of Power System Stability and Analysis Using Facts Controller

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## ABSTRACT

Low frequency oscillations are acceptable when major power system are connected by lines of the junction, or low-frequency oscillations by little Manifestations in load changes, such as system, are created. These are usually small signal stability of power systems (linear Response) are analyzed. These oscillations and instability of the system that led to other system performance degrade to do it. Transmission capacity and sometimes even these oscillations cause loss of synchrony, the breakdown of the system of capacity led to a limiting the power of the network. To this end, the power supply system, generate additional control signals stabilizers are used to reduce the frequency of these oscillations power systems, with a view to amortize stimulation system.

*Keywords:* oscillations, small signal stability, Synchrony, supply system stabilizers.

## 1. INTRODUCTION

The power supply system of generator excitation system stabilizers modulations oscillations damping developed to facilitate has been done. PSS basic operation stimulation system with torque rotor oscillations that depreciation stage which builds to apply a signal. Oscillations can occur in the power system due to load fluctuations or to the transmission line that can even apparently, switching occur. The method used to present a systematic method for designing continuous Ubiquitous distributed load to quick action control for regulation of primary frequency in energy distribution networks, by the formulation of a control of optimal load (OLC) problem [1]. The method of analysis by which the transitory stability of the induction machine is maintained regardless of the fault clearance time is introduced [2]. The stability of the voltage based on MATLAB toolbox (VST) designed to analyze the stability of the voltage and bifurcation of problems in electrical power systems [3]. A new hierarchical control designed for both dynamic and the state of equilibrium is proposed improvement of stability, and a full analysis is presented of various signals measurable input locally who can be used for the controller[4]. This describes new structures for a better stability of the controllers of excitation designed with the help of a system multi-machine non-linear model and direct method of Liapunov [5]. Flywheel is now used in the advanced technologies non polluting blocks of uninterruptible power supply [6]. Introduces a new unit of commitment, adapting extended priority Problem List (EPL) method [7]. The use of market mechanisms to determine the generation dispatch and the natural tendency to seek a better economic efficiency through fast updates of the market raises a critical question [8].

## 2. POWER SYSTEMS STABILIZER (PSS) DESIGN

Power supply system stabilizers are an effective mechanism for the amortization of electromechanical oscillations especially in interconnected power system. There are two optimization problems related to the

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SSP. Selecting the optimum location of a SSP and optimum stability standards to determine the latter. Changes in the power system Due to disturbances occurring in, electro power generators of mechanical oscillations are included. These oscillations are also called power swings and they maintain the system stability should be effectively damped.

The electrical oscillations can be classified into four main categories:

1. Local oscillations: These oscillations remains of a unit and plants and also between these and the rest of the power system are developed. Their Frequency 0.2 Hz to 2.5 kHz usually varies from.
2. Interplant oscillations: Power generation two plants between these oscillations occur. Their frequency 1Hz to 2Hz may vary.
3. Between zone : Oscillations swinging against each other coherent generator groups means and their frequencies generally 0.8 Hz to 2 Hz, generally called low frequency oscillations.
4. Command mode: Mode oscillations frequencies observed of the Colombian system, oscillatory behavior are typically caused by incorrectly A wide range of posts, including that of stimulation, turbine-automated generation of Governors, controls and other devices such as HVDC, static var compensators, and weight-some sort of systems associated with the controllers adjust.

The main advantage of PSS is a cost-effective electronic power controllers based on facts compared to the electronic counter part.

### 3. TRANSIENT STABILITY

Modern power system development study to increase the complexity of the power supply system has led to even more new challenges for power system stability especially fleeting aspects of small-signal stability. Fleeting stability control stable in case of strong disturbances and faults of exploitation power system is an important one of the important role and there for research area.

The aim of the study of transient stability is to check if the angle of loading refers to a stable value after the approval of the disturbance. The stability studies are designed to determine if the system in transitional period on the next big unrest synchrony will continue as the flaws of the transmission system, the sudden load changes, and the loss of production units or switching off the line. The temporal stability of a generator depends on the difference between the mechanical energy and electric. During a standard, the electrical

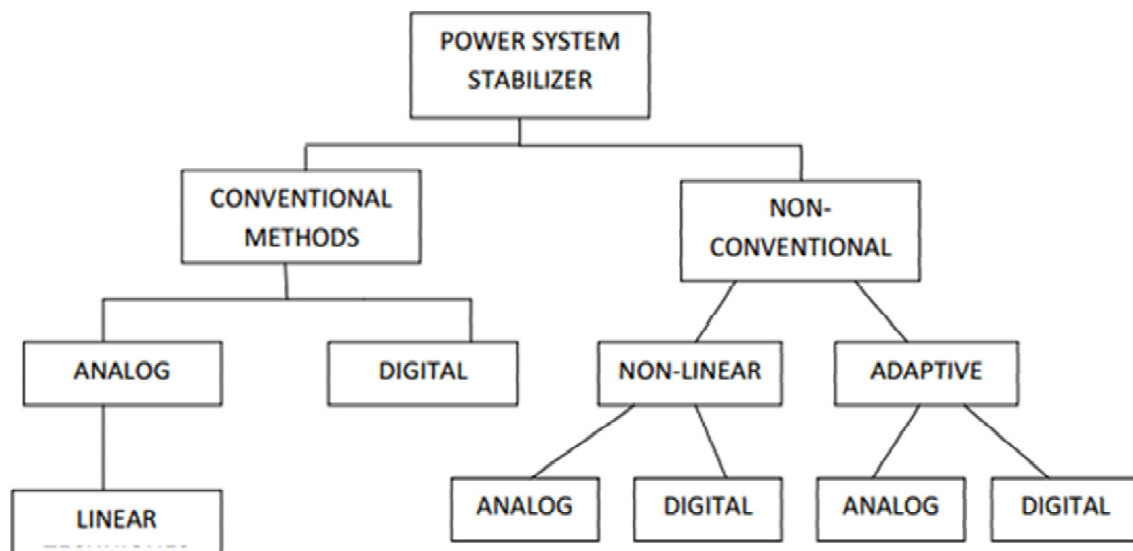


Figure 1: Power system stabilizer

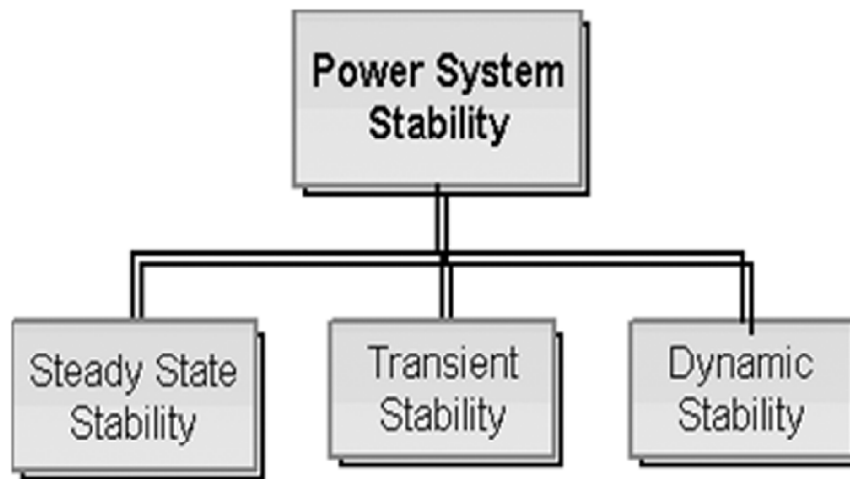


Figure 2: Transient Stability

supply reduced suddenly in mechanical power remains unchanged, so speeding up the rotor. To the temporary stability, the generator the excessive force transferring into the system. To this end, the devices of the facts existing can be employee.

There are so many factors that influence the stability studies transient. The main factors are listed below.

- Types of fault
- The location of the default.
- The severity of the fault
- Speed of clearing the fault.

#### 4. NEED FOR SYSTEM ANALYSIS IN PLANNING AND OPERATION OF POWER SYSTEM

The system envisaged is to be optimal in terms of the cost, the efficiency and effectiveness of the operation. To improve the planning, the knowledge of the power system with reference to the suite is important:

- Analysis of flow of charge
- Short-circuit or faults of the analysis of the calculations
- The stability analysis

#### 5. FACTS CONTROLLER

In the past two decades, the demand for electricity has increased significantly and the expansion of the production of electricity and the transmission significantly limited due to the limited resources and environmental restrictions. Accordingly, certain transmission lines are heavily loaded and the stability of the system is a limiting factor in the transfer of power. Flexible alternative current transmission systems (facts) controllers are mainly used to solve various system or constant current supply to the problems of the control of the State. The facts are devices that allow for the flexibility and dynamic control of energy systems.

Flexible alternating current transmission system devices prove to be very effective in a mark of the transmission network for better use of the existing facilities without compromising the desired stability margin. Controllers for transmission system flexible alternative, such as static var Compensator (SVC) static synchronous compensator uses the latest technology for switching power electronics in the

transmission of electrical energy for the control systems of the voltage and the power of the flow and play an important role as a stability for the benefit of the disturbances in the transient and electric networks with each other.

Facts devices can be an alternative to the stream of rules that heavily loaded, resulting in an increase of the loadability, low loss of the system, improving the stability of the network, the reduction of production costs and contractual requirements filled by controlling the flow of energy in the network

## 6. VARIOUS FACTS CONTROLLERS FOR ENHANCING POWER SYSTEM CONTROL

- Synchronous compensator static (STATCOM)
- Static var Compensator (SVC) -Checking the voltage
- Controller of supply flow unified (UPFC)
- Compensator of convertible series (CSC)
- Inter-Contrôleur power flow of phase (IPFC)
- Serial Controller Static synchronous (SSSC)
- Thyristor controlled series compensator (TEAC)-Check the impedance
- Thyristor controlled dephasing of the transformer (angle of controls) TCPST
- Storage of magnetic energy super conduct (SMES)-Control of voltage and power

## 7. THE BENEFITS OF THE USE OF DEVICES BY THE FACTS

The benefits of the use of facts devices in the electric transmission systems can be summarized as follows:

- A better use of the assets of the system of existing transmission
- Increased the reliability and availability of the transmission system
- Dynamic increase and the stability of the network and transient reduction of loop flows
- Improvement of the quality of the offer for sensitive industries
- Environmental benefits a better use of the assets of the system of existing transmission

## 8. CONCLUSION

The stability of a system of AC power supply is rated as a function of its ability to recover from planned and random electrical faults through switching operations, defects, variation on the question load, etc. the transient stability is very essential for the analysis of the system for energy supply. This work is focused on presenting a methodology for the analysis of transient stability of electric energy of the system. This will help and guide for the improvement of the analysis of the stability. It has been observed that the control in the side-load complex. It is therefore proposed to control the side of the generation. By controlling the side of the generation, the synchrony of the system is always maintained if the error is caused by the voltage or current. Also contributes to maintaining the efficiency of the system and offer a better service to the consumer. In order to facilitate the complex system in synchronous state transient analysis is inevitable.

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