FACULTY OF ELECTRICAL ENGINEERING

POWER SYSTEM STABILIZER IN DYNAMIC STABILITY ASSESSMENT

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ABSTRACT

Power system disturbance have occurred since the initial development of power systems. Most disturbances are caused during stressed power system conditions followed by sequence of low-probability outages. Dynamic stability is identified as the main issue in real power system. Thus, power system stabilizer (PSS) is vital to ensure small signal stability of power systems. Low frequency oscillations are detrimental to the goals of maximum power transfer and optimal power system security.

A contemporary solution to this problem is the addition of power system stabilizers to the automatic voltage regulators on the generators in the power system. The damping provided by this additional stabilizer provides the means to reduce the inhibiting effects of the oscillations. Power producers can take steps to ensure that their generator controls are equipped to support transmission system reliability by enhancing the excitation controls.

This report presents dynamic stability assessment in the presence of power system stabilizer. A simple Matlab/Simulink model has been developed to represent the transmission system for the propose dynamic stability assessment. Various experiments have been conducted to realize the impact of PSS on the system stability.

KEY WORDS

Power System Stabilizer (PSS), Automatic Voltage Regulator (AVR), Dynamic Stability

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CHAPTER 1 : INTRODUCTION

1.0 Background of Study

Interconnected power systems have been working in a generally satisfactory manner for many years. Of course, they have evolved ***so*** as to overcome the problems which have arisen from time to time. Generator excitation controls have been installed and made faster to improve transient stability stabilizers to the excitation systems to improve oscillatory instability[1]. In very large systems, few adverse interactions are observed which detract from the overall system performance. Early power system stabilizers, with speed as input, caused shaft torsional oscillations to become unstable, and power input stabilizers were found to lead to large changes in the generator voltage when the generator power was being ramped. But, solutions to both of these problems are well known [2,3]**.** While there have been much discussion on power system stabilizer tuning; relatively simple methods are available which give good performance and robustness to system changes [4,5]**.** Less well known, is the effect of a power system stabilizer on the ability of the system to maintain voltage and frequency when the system's load changes.

Power system stabilizer refer to the ability of synchronous machines to move from one steady-state operating point following a disturbance to another steady state operating point without losing synchronous[5]. Faults in any power generating system that is connected at the top of the grid can cause widespread transmission system failure. Power system oscillation (dynamic instability) can result from transmission system disturbance. PSS can be viewed as an additional block of a generator excitation control or Automatic Voltage Regulator (AVR) to improve the overall power system dynamic performance especially for the control of electromechanical oscillations.

Power system faults, line switching, generator disconnection and the loss and application of large blocks of load result in sudden changes of the electrical power,