

REVIEW ON CONTINGENCY ANALYSIS IN POWER SYSTEM AND IMPROVEMENT OF POWER SYSTEM SECURITY

NIRAJ H. PATEL¹, VISHAL THAKKAR²

¹ M.E. Electrical Department, Kalol Institute Of Technology & Research Centre, Kalol-382721 (GUJARAT)

² Assistant professor, Electrical Engineering Department, Kalol Institute Of Technology & Research Centre, Kalol-382721 (GUJARAT)

nirajpatel_4491@yahoo.in

ABSTRACT—The goal of this power system analysis function is to give the operator information about the static security. Contingency analysis is used to calculate violations. This paper presents the overview of contingency analysis of power system is to predict the line outage, generator outage and to keep the system secure and reliable. Whenever the maximum violation is occur in power system, that line and generator is outage element. So we find the maximum violation in the system network. For the generation, transmission, and distribution system, security can be assessed using contingency analysis. This paper describes the review of the methodologies of the power flow analysis of power system network In this paper, it is discussed the review of how contingency conditions are analyzed after that according to severity of contingency a real power flow performance index (PI) sensitivity based approach and the line outage distribution factor has been used to decide optimal location of series FACTS devices.

Keywords—Contingency Analysis, Line Outage, Generator Outage, Location Of Series FACTS Devices.

I. INTRODUCTION

Contingency analysis gives the security status of the power system network and list of critical contingencies. Contingency analysis is achieved by running power flow cases after removing different elements of the power system network such as a transmission line, transformer, bus or generator. Most of the EMS software available in the market has the contingency analysis option. Some of the main software, such as Power World, PSS/E, and PSS/O are used by the operators at the control centers in utilities to run the contingency analysis ahead of time for system planning.

As mentioned above contingency analysis is achieved by removing different types of elements. Transmission lines, transformers, generators and buses are the key components of power system network. Different kind of contingencies that can happen based on these important components. The desired voltage level is maintained using the transformers which step up/down the voltage according to the requirements. A transformer outage is also one of the important outages in the system. During contingency analysis, transformers are generally considered as the transmission line outage with consideration of resistance and susceptance. It is very important to know the transformers and their functionalities when the load changes in the system, since they are responsible for the voltage profile in the network. Generators are the source of power for the system. Loss of generation causes many problems in the system and may lead to a blackout. Buses are the main components of the power system network, particularly because of their connections in the system. All the transmission lines, transformers and generators are connected to the rest of the system through the buses. An outage of the bus is typically an outage of all the elements connected to that bus, which becomes very huge loss if the number of elements connected to that bus is higher. A bus outage is thus considered to be critical. Thus different types of contingencies and their study will help in better planning of the system and helps the operator in preparing for them. Some events can cause outage of multiple components in the system causing more loss compared to single contingencies.

The desirable attributes in an electrical power system are economic operation, minimum damage to the environment, and security of energy supply. A power system supply is considered to be secure when the probability of power supply failure is low. A power supply failure occurs due to tripping of a transmission line or an equipment malfunction and if this trend is not arrested, it may lead to the blackout of a region due to cascading effect.