IMPLEMENTATION OF TRANSMISSION LOADING RELIEF (TLR) TO ALLEVIATE OVERLOADING IN TRANSMISSION SYSTEM

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ABSTRACT

In an open access electricity markets, the amount of power transfer are estimated based on the off-line computation of available transfer capability (ATC). Inaccurate value of ATC may yield to security violations of transmission system and this requires the utility operators to invoke transmission loading relief (TLR) in order to maintain the reliability of transmission system. This thesis presents the relationship between TLR and ATC. The TLR is invoked by the power system operators in order to improve the utilization of the transmission system when there have overloaded lines. The ATC is determined by using the DC power flow and power transfer distribution factor (PTDF). The power transfer is obtained by injected the power at generator bus and the same amount of power extracted at load bus. The value of MW power transfer is varied randomly until there is no overloaded line occurred and this action is called as the TLR. The overloaded line is represented based on a negative value of ATC and this requires the implementation of TLR. A case study of the 6 bus IEEE RTS is used to verify the effectiveness of TLR to alleviate the overloaded transmission lines during power transfer.

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CHAPTER 1

INTRODUCTION

1.1 Available Transfer Capability (ATC)

Transfer capability plays an important role in the power systems because one of the concepts in the restructuring of the electric power industry is the ability to accurately and rapidly quantify the total transfer capability (TTC) and available transfer capability (ATC) of the transmission system [1]. Electric utilities require posting information on ATC of their transmission system so sellers and buyers in planning, operation and reserving the transmission services [2]. In the context transfer capability, TTC is defined as the maximum amount of power that can be transferred over the interconnected transmission network in a reliable manner while meeting all of a specific set of defined pre and post-contingency.

The transfer capability of the system is divide into two different sets of transfer, namely, the area-to-area ATC and point-to-point ATC. Area-to-area ATC is the additional amount of power that may transfer from the seller control area to the other buyer control area. On the other hand, point-to-point ATC is the additional amount of power that may transfer from one location of seller bus to the other location of the buyer bus [1]. ATC is also analyzed and quantified by considering the effect of contingencies such as line outages. Initially, contingency ranking is used to select the critical lines that adversely affect the ATC. Such transfer capacity can be used for reserving transmission services, scheduling firm and non-firm power transfer and for arranging emergency power transfers between areas of an interconnected power system. When electric power is transferred from one point (or area) to another, the entire transmission network responds to the transaction [3]. Power flows on transmission lines and interfaces change depending on many factors such as network topology, generation dispatches, customer demand levels and other