

Nathapon Anantasirisombut 2011: Evaluation of Maximum Wheeling Capability in a Deregulated Power System. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Parnjit Damrongkulkamjorn, Ph.D. 97 pages

This thesis presents the study of maximum wheeling capability in a deregulated power system. The maximum wheeling capability is determined as the maximum amount of additional real power load injecting into a specified “seller bus” and simultaneously taking out of a specified “buyer bus” without violating any operating power flow constraints. The constraints include voltage limits, line flow limits and reactive power generation limits. The proposed method to calculate the maximum wheeling capability starts by solving optimal power flow (OPF) solution for base case system with no wheeling transaction. Then the power flow solution with additional wheeling real power is solved with given seller and buyer buses, where the seller bus is set to be the slack bus in order for the seller bus to cover the additional losses due to the wheeling transaction. Moreover the bus voltages and power output generations for generator buses are fixed to be the values from OPF in order for the system to stay unchanged and optimal. The initial amount of wheeling real power is approximated by determining the minimum remaining capacity of the lines connected to the buyer bus. The amount of wheeling real power is updated by using the ratio of operating parameters and their limits. When any operating limit is met, the amount of wheeling real power can not be increased and therefore it is the maximum wheeling capability of the system for the given seller and buyer buses. The proposed method is tested on the IEEE 30bus system. The results show that the method could evaluate the maximum wheeling real power without violating any operating constraints while the system stays optimal.

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