Developing Algorithm for Power Flow Analysis in Power System with UPFC aiming to Enhancing Voltage Profile and Loss Reduction[*]

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Abstract

Unified Power Flow Controller (UPFC) plays a vital role in improving the power system performance, both the static and dynamic, and enhanced the system loading capability by rerouting the power flow in the network.

This paper presents control and performance of UPFC intendedfor installation on the transmission line to control power flow and improve voltage profile.

Voltage sources model is utilized to study the behavior of the UPFC, This model is incorporated in Newton-Raphson algorithm for load flow studies. The modified Jacobian matrix and power mismatch equations are deduced to control active and reactive powers and voltage magnitude in any combination or to control one of them.

A Newton-Raphson load flow program has been developed which includes comprehensive control facilities and exhibits strong convergence characteristics.

Test results are presented on 5-bus system and Syrian 230 kV network, which demonstrate the effectiveness of the developed program.

Keywords: UPFC, FACTS, Newton-Raphson load flow algorithm, UPFC VSM, load flow analysis,

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