

TITLE:

Unified Power Flow Controller in Voltage Stability Problem

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ABSTRACT:

The overall objective of the paper is to show that the Unified Power Flow Controller (UPFC) is capable of solving the voltage stability problem provided that its converter power ratings are sufficiently sized. If being timely initiated, the UPFC is able to simultaneously support voltages and redirect power flows, thereby helping the system to avoid the voltage collapse driven by a composite load recovery and an insufficient reactive power generation. Within a longer-term time domain response of the system, the composite load sensitivity analysis is applied in order to reveal critical load parameters as well as the critical time instant during the time domain trajectory. Soon after having the critical point detected, the UPFC is accordingly initiated to establish a stable system operating point. The sufficiency of the UPFC converter power ratings is evaluated from two viewpoints of adequacy: the optimal rating algorithm concerning a series power flow control as the initial estimate, and further thorough time domain analysis regarding other operational aspects within dynamic voltage collapse scenario.

KEYWORDS:

Voltage stability, composite load, sensitivity, FACTS, UPFC