

A communication-free reactive-power control strategy in VSC-HVDC multi-terminal systems to improve transient stability

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Abstract-

This paper proposes a new reactive-power control strategy for High Voltage Direct Current multi-terminal systems with Voltage Source Converter stations (VSC-HVDC) to improve transient stability in electric power transmission systems. The proposed algorithm uses local measurements to estimate, in each converter station, a weighted average of the frequencies seen by the VSC stations of the HVDC multi-terminal system. This estimation is carried out making use of a (small) auxiliary local active-power modulation along with the DC-side voltage droop control in the VSC stations, where the latter also uses local measurements only. The estimated frequency is used as the set point for supplementary reactive-power control at each converter station. The proposed control law has been simulated in a test system using PSS/E and the results show that it improves transient stability, significantly, producing similar results to those obtained controlling reactive power using global measurements.

Index Terms- VSC HVDC; Multi-terminal; Transient stability; Reactive power control; Power systems; Local measurements

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