Improved Voltage Stability Boundary Monitoring by Accounting for Variations in Thevenin Voltage Magnitude.

This paper identifies weakness of existing method for voltage stability assessment and proposes new approach for determining point of maximum deliverable power to a given load that accounts for the variations in the Thevenin voltage magnitude. The approach uses Thevenin equivalents seen from nodes of constant voltage magnitude and load nodes in order to determine a distance to instability. A simple five-bus system together with IEEE 14 bus system were used in order to perform dynamic simulation in PSS/E. The simulation data were used to create synthetic Phasor Measurement Unit (PMU) snapshots, which served as input to the proposed approach. The new approach is demonstrated on the two test systems, where improved accuracy in determining the point of maximum deliverable power is demonstrated. The results show that the point of maximum deliverable power to the load occurs well before the Thevenin impedance matching criteria.

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