Enhancing the Power System Observability with the Aid of Phasor Measurement Units

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Abstract

This paper presents an approach for optimally allocating the Phasor Measurement Units (PMUs) in a power system. The proposed approach is based on Binary Integer Programming (BIP) to minimize the total number of PMUs that can achieve full system observability. The full system observability is ensured both in normal operating conditions and in case ofN-1 contingencies such as the outage of a PMU or a transmission line. Moreover, the approach is utilized to allocate the PMUs in case of limited number of PMU channels. The problem formulation considers the Zero Injection Buses (ZIBs) and uses a set of rules that can improve the redundancy of the PMUs by choosing better locations without increasing their number. The proposed approach is applied on the IEEE standard systems 14, 30 and 57 test systems. The simulations results are compared with other approaches used in the literature to validate the performance of the proposed approach.

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