Title:	A Novel Approach for Secure Hybrid Islanding Detection Considering the Dynamic Behavior of Power and Load in Electrical Distribution Networks
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Abstract:

In the arena of modern electrical power distribution systems, distributed generators (DGs) are emerging as a manifestation of electric power personalization. Even though DGs have various advantages, unintentional islanding phenomena caused by DGs during abnormal grid operations can damage equipment connected to the grid. Therefore, islanding detection mechanisms are essential for DGs in grid-connected mode to disconnect the DG from the grid in case of grid abnormalities by obeying to specific grid codes. In this regard, a novel approach to develop a secure hybrid islanding detection method (IDM) is presented in this paper. The proposed hybrid IDM is developed by combining two passive IDMs known as rate of change of active power and rate of change of reactive power with an active IDM called load connecting strategy. An 11 kV Malaysian distribution system integrated with three types of DGs, namely synchronous generator, photovoltaic, and biomass, has been chosen as a testbed for the verification of the proposed hybrid IDM. Seven different case studies have been conducted in the PSCAD/EMTDC platform to validate the performance of the proposed IDM for islanding and non-islanding events. The simulation results confirm that the proposed IDM can detect islanding within 0.09 s, which is within 2 s complying with IEEE and IEC standards. Further, a comparative study based on the detection time and non-detection zone has been carried out, which has confirmed that the proposed IDM demonstrates better performance compared to the previously developed hybrid IDMs.