

Impact of soft open point (SOP) on distribution network predictability

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Abstract-

With the increasing penetration of renewable energy sources (RESs), the consequent rising levels of uncertainty faces distribution network operators with significant decision-making challenges. So, predicting the state of the network with high accuracy is very important to make operational and planning decisions and better risk management. The soft open point (SOP) as a novel power electronics-based device has been introduced to control active power flows, compensate reactive powers, and regulate voltage for flexible operation of distribution networks.

In this paper, the effect of SOP on the predictability of the distribution network state has been investigated. Two defined indices, current predictability index (CPI) and voltage predictability index (VPI), are considered to quantify the ability of network predicting. The Latin hypercube sampling (LHS) method is implemented for probabilistic evaluation and extracting the predictability indices. Also, the correlations among uncertain input variables are modeled by Cholesky decomposition method. The results of the proposed method are argued on IEEE 33-node and IEEE 118-node networks.

Index Terms- Renewable energy sources; Uncertainty; Soft open point; Predictability; Latin hypercube sampling; Cholesky decomposition

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