

عنوان مقاله:

A New Optimal Distributed Strategy to Mitigate the Phase Imbalance in Smart Grids

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خلاصه مقاله:

In a three-phase distribution system, due to unequal distribution of single-phase loads, load diversities, the different consumption patterns, and growing penetration of renewable energy resources in smart grids, the problem of unbalanced power flow becomes more challenging. In this paper, we propose a new innovative phase imbalance mitigation (PIM) scheme performed by smart meters. With aid of the proposed optimal phase assignment for 3-phase power distribution input feeders known as phase rearrangement (PR), Electrical storages (ES), and the Renewable energy sources (RES), smart meter owners are inspired to assist the distribution system operator (DSO) in diminishing the phase imbalance. This is achieved by employing a proposed connection point assignment system which has the flexibility of selecting the power input among the three phases and management of ESs and RESs. We model this problem into a mixed integer linear program, where smart meter owners minimize their electricity bill. Simulation results confirm the proposed approach and show smart meter owners will save on their electricity bill and the DSO will get benefit by improving the power quality of the grid and significant decrements of the power flow imbalance.

کلمات کلیدی:

Smart Distribution Grid, Smart Meter, Phase Imbalance, Phase Rearrangement

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