

A clustering-based method for quantifying the effects of large on-grid PV systems

Walid Atef Hafez ElMetwally Omran ,Mehrdad Kazerani, Magdy MA Salama

Abstract

Analyzing the impacts of large on-grid photovoltaic (PV) systems on the performance of the electric network is an essential task prior to the installation of these systems. To quantify these impacts, a method based on chronological simulations can be used. The main advantage of this method is its ability to provide information about the impacts of the fluctuation of the power generated from the PV systems. However, this method requires performing extensive analysis and simulations, making it impractical for utility studies, especially if long historical data with subhourly time resolution is used. In this paper, a new method that utilizes the data efficiently while preserving the temporal information of the generated PV power is proposed. The method takes advantage of the clustering techniques to group together segments of the output PV power having similar features. Hence, a representative segment for each group can be chosen and used in the analysis and simulations. This representative segment can provide information about the expected performance of other segments of the group. The validity and usefulness of the proposed method are demonstrated by identifying the suitable size and site of a large PV system.

IEEE Transactions on Power Delivery 2010, August