2.4.5 Энергетические системы и комплексы (технические науки)

ВНЕДРЕНИЕ СОЛНЕЧНЫХ ЭЛЕКТРОСТАНЦИЙ МАЛОЙ МОЩНОСТИ В РАСПРЕДЕЛИТЕЛЬНЫЕ СЕТИ УЕЗДА ЦИСЯНЬ КИТАЙСКОЙ НАРОДНОЙ РЕСПУБЛИКИ

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Аннотация. *В данной статье исследуется влияние солнечных электростанций (СЭС) на качество электроэнергии в распределительных сетях, а также анализируются возникающие проблемы и возможные решения. Особое внимание уделяется ключевой проблеме – несимметрии трехфазного напряжения, вызванному случайным характером выработки и однофазным способом подключения. С помощью имитационной модели распределительной сети, построенной на платформе PSCAD, анализируются два типичных сценария подключения: случайное распределение СЭС по трем фазам и влияние изменения соотношения между мощностью нагрузкой и СЭС на показатели качества ЭЭ (напряжение, частота, коэффициент несимметрии напряжения, общие гармонические искажения). Представлена стратегия оптимизации параметров инвертора, фильтров для решения проблем с качеством ЭЭ. В заключении обобщены негативные последствия неоптимального подключения СЭС и даны рекомендации по оптимизации подключения и эксплуатации для обеспечения стабильной работы распределительной сети.*

Ключевые слова: *солнечная электростанция, показатель качества электроэнергии, трехфазная несимметрия напряжения, коэффициент гармонических искажений*

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IMPLEMENTATION OF SMALL-SCALE SOLAR POWER PLANTS IN THE DISTRIBUTION NETWORKS OF QIXIAN COUNTY, PEOPLE'S REPUBLIC OF CHINA

Abstract. *This article examines the impact of photovoltaic power station on the power quality in distribution networks, and also analyzes the emerging problems and possible solutions. Special attention is paid to the key issue – three-phase voltage unbalance caused by the random nature of generation and the single-phase connection method. Using a simulation model of a distribution network built on the PSCAD platform, two typical connection scenarios are analyzed: random distribution of stations across three phases, and the influence of changes in the ratio between load power and photovoltaic power station power on power quality indicators (voltage, frequency, voltage unbalance factor, total harmonic distortion). A strategy for optimizing inverter parameters and filters to solve power quality problems is presented. The conclusion summarizes the negative consequences of suboptimal connection of stations and provides recommendations for optimizing connection and operation to ensure stable operation of the distribution network.*

Keywords: *photovoltaic power station, power quality indicator, three-phase voltage unbalance, total harmonic distortion*

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