Research on improving power quality in microgrids

Can Microgrid technology improve power quality?

Microgrid technology has emerged as a promising option to integrate distributed generation and facilitate the widespread use of grid-connected renewable energy. However,ensuring appropriate power quality (PQ) in microgrids is challenging. High PQ is crucial for achieving energy efficiency and proper operation of equipment.

What causes power quality disturbances in microgrids?

Sources of power quality disturbances in microgrids. In the midst of a global energy crisis, concerns about energy resources and climate change are widespread worldwide. Fuel-based electricity generation significantly contributes to greenhouse gas (GHG) emissions, intensifying the issue.

What is energy management in hybrid microgrids?

Scientific Reports 15, Article number: 36201 (2025) Cite this article Energy Management (EM) in hybrid Microgrids (MGs) is essential for coordinating Renewable Energy Sources (RESs) and Hybrid Energy Storage Systems (HESSs) to ensure Power Quality (PQ), stable operation, and efficient power flow.

What is a microgrid & how does it work?

Author to whom correspondence should be addressed. Microgrids (MGs) are systems that cleanly, efficiently, and economically integrate Renewable Energy Sources (RESs) and Energy Storage Systems (ESSs) to the electrical grid. They are capable of reducing transmission losses and improving the use of electricity and heat.

Power quality (PQ) in distributed energy resources (DERs) is paramount for maintaining a stable and efficient electricity supply. The consistency and cleanliness of power are integral to ...

Research gap and motivation Despite these advances, there remains a lack of comprehensive EM strategies that holistically minimize power loss, reduce THD, lower energy cost, ...

Further, it also has the capability of effective dynamic control of the line impedance, enhancing system controllability and reliability, improving utilization of assets, and ensuring better ...

This chapter addresses the pivotal challenge of maintaining power quality within microgrids, a critical component for their effective and sustainable operation. It presents a ...

The management of energy among the various energy sources and the enhancement of the quality of power has become a great topic of research interest among researchers (García Vera ...

1 Introduction 1.1 Background Smart energy systems have undergone a significant transformation with the advent of microgrids (MGs). These self-sufficient power networks connect ...

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We aim to gather research that contributes to the improvement of power quality in microgrids in terms of topologies, converter configurations, algorithm development, and experimental ...

Abstract Integration of renewable energy sources into the power grid has become a critical research topic in recent years. Microgrid technology has emerged as a promising option to integrate ...

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