

Harmonic Control in Microgrids

How to maximize harmonic power absorption in a microgrid?

In view of the above, this paper proposes a novel harmonic power allocation strategy which gives priority to the voltage quality of the microgrid. The core idea is to maximize harmonic power absorption by shaping lowest output impedances of inverters, on the premise that all inverters are not overloaded.

Can a microgrid improve voltage quality?

Existing research mainly focuses on harmonic power sharing among multiple inverters, which ignores the diversity of different inverters to mitigate harmonics from nonlinear loads. As a result, the voltage quality of the microgrid cannot be effectively improved.

Can centralized current-based control be used in low-voltage microgrids?

This paper discusses a centralized current-based control for distributed generators in low-voltage microgrids, capable of accurately sharing among the units the active, reactive, and harmonic current needs of the microgrid, without requiring knowledge of the network topology and parameters.

How is a low-voltage microgrid tested?

The proposed methodology is evaluated through simulation and experimental tests on a single-phase low-voltage microgrid prototype comprising nonlinear loads and two converters. Different cases of generation limits, load variations, voltage levels, voltage distortions, and line parameters are considered in the reported tests.

Can harmonic compensation be integrated in a hierarchical control framework?

This paper proposes a harmonic compensation technique integrated into a hierarchical control framework for active and reactive power control. The approach is implemented using a current-based control (CBC) method and its operation is reported experimentally. The following merits are shown:

How does distributed harmonic current compensation work?

In the proposed approach, distributed harmonic current compensation is achieved without interfering with the converter's power exchange. This allows for the efficient interfacing of local energy resources (e.g., renewable sources, storage devices) with the grid.

In this paper, harmonic compensated individual-phase voltage control of four-leg inverters is proposed for microgrid applications. Individual-phase control, which is one of the promising voltage control methods of four-leg inverters, ensures robustness for high load unbalance rates. However, the odd harmonics generated by nonlinear loads and dead time ...

The microgrid concept has been emerged into the power system to provide reliable, renewable, and cheaper electricity for the rising global demand. When the microgrids are introduced, there will be several concerns, such as active and reactive powers" sharing, load management, connecting to the main grid, and voltage and

current deviations. Recently, with the fast ...

Conventional droop control may cause the poor harmonic power sharing among the distributed generations (DGs) due to the mismatched line impedance. This paper proposes an adaptive ...

Microgrids . Sunghyok Kim *, Songchol Hyon, Jinsong Choe, Wisong Jong . Department of Electrical Engineering, Kim Chaek University of Technology, Pyongyang, Democratic People's Republic of Korea. ... control can cause poor harmonic powersharingamong the DGs due to mis-matched line impedance. This paper proposes a harmonic power-sharingcon-

This paper proposes a hierarchical harmonic control method to mitigate the harmonic voltages and currents of all buses in grid-forming wind power plants. The proposed method effectively ...

To address the unbalanced and harmonic power sharing issue among parallel inverters caused by feeder impedance mismatch in islanded microgrids, an adaptive virtual impedance control method is ...

A distributed event-triggered power sharing control strategy that adaptively regulates the virtual impedances at both fundamental positive/negative sequence and harmonic frequencies and accurately share the reactive, unbalanced, and harmonics powers among distributed generation units is proposed. For several reasons, particularly due to the mismatch ...

Total harmonic distortion is an important issue in integrated distributed generation energy systems which affect the performance. Interline hybrid continuous converter impedance control-based tuned filter is proposed to mitigate the harmonics, i.e., 10-12% reduction in integrated energy system. Effective transformer impedance is used instead of ...

Existence of nonlinear loads makes load power sharing more challenging in the islanded microgrids. Conventional droop control may cause the poor harmonic power sharing among the distributed generations (DGs) due to the mismatched line impedance. This paper proposes an adaptive regulation method of the virtual harmonic impedance for the accurate harmonic ...

The design of harmonic control parameters based on closed-loop pole analysis is discussed in detail. Experimental results show that with limited computation resources, the proposed control ...

One of the challenges encountered by islanded microgrids is voltage distortion, which is induced by nonlinear loads. The unreasonable distribution of harmonic power among distributed inverters can lead to the overloading of inverters. Existing studies achieve harmonic power sharing based on fixed value, which lacks flexibility. Therefore, this paper proposes a distributed harmonic ...

Regarding synchrophasors, the classification corroborates that odd harmonic contents present better discriminant potential when compared to even, and the usage of angle information subtly enhances outcomes.

... A.E. et al. Usage of Harmonic Synchrophasors for High-Impedance Fault Classification in Microgrids. J Control Autom Electr Syst 35, 485 ...

A harmonic distortion limit module is added to the proposed control scheme so that the THD of PCC voltage can be kept less than 5% even under relatively severe load conditions. This paper proposes a new control scheme for harmonic power sharing and PCC voltage harmonics compensation in islanded microgrids by adopting virtual harmonic ...

In order to mitigate the harmonic voltage distortions caused by nonlinear loads in islanded microgrids, this paper proposes an enhanced adaptive virtual impedance control method which can achieve reduction of the harmonic voltage distortions at the point of common coupling (PCC) without feeder impedance information. A microgrid central controller (MGCC) ...

A Virtual Synchronous Generator Control Strategy for Microgrid Based on Harmonic Current Bypass Control March 2022 International Transactions on Electrical Energy Systems 2022(12):1-11

Due to the presence of unbalanced non-linear loads in ac microgrids, a triple-harmonic-droop control scheme is proposed to guarantee proper harmonic power sharing as well as accurate unbalanced power sharing. For this purpose, the proposed harmonic power sharing loop is applied to the recent triple-droop control system so that the harmonic ...

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