Cooperative control of distributed energy storage system in microgrid

School of Automation, Guangdong University of Technology, Guangzhou, Guangdong, China; To simultaneously solve the problems of the state-of-charge (SOC) equalization and accurate current distribution among distributed energy storage units (DESUs) with different capacities in isolated DC microgrids, a multi-storage DC microgrid energy ...

Simulations have been completed showing that the cooperative control system is able to maintain voltage regulation in situations for which the traditional droop control fails. This paper proposes a distributed multi-agent cooperative control system for dynamic energy balancing between storage devices in droop controlled DC microgrids. With the traditional droop control strategy, line ...

Keywords: DC microgrid, distributed access, multi-hybrid energy storage system (multi-HESS), dynamic balance of SOC, renewable energy. Citation: Li H, Fu L, Zhang Y and Xiong Y (2022) A Dynamic and Cooperative Control Strategy for Multi-Hybrid Energy Storage System of DC Microgrid Based on SOC. Front. Energy Res. 9:795513. doi: 10.3389/fenrg ...

Dis-tributed control methods of DC microgrids are mostly based on the consensus algorithm. Ding et al. [3] proposed a distributed cooperative control method, which is considered one of the ...

In microgrids, the ESSs can be installed in a centralized way by the utility company at the point of common coupling (PCC) in the substation [] sides, the ESSs can also be integrated in a distributed way such as plug-in electric vehicles (PEV) and building/home ESSs [17, 18] pending on the operation modes of microgrids, the ESSs can be operated for ...

This paper develops an improved distributed finite-time control algorithm for multiagent-based ac microgrids with battery energy storage systems (BESSs) utilizing a low-width communication network.

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A novel distributed control scheme for multiple HESSs based on a leaderless consensus protocol to realize the power splitting between batteries and SCs and thus regulate the dc bus voltage and the voltage quality and the energy storage lifetime can be improved. Hybrid energy storage system (HESS) consisting of battery and supercapacitor (SC) is an effective ...

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These days, distributed generators (DGs) based on renewable energy sources (RESs) and energy storage systems (ESSs) have been widely used in modern power systems to deal with environmental problems and the reduction of fossil fuel [1], [2], [3], [4] this context, microgrids (MGs) have emerged as an effective solution for the integration of multiple ...

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storage DC micro grid; In the third part, the distributed contr ol strategy of h ybrid energy stora ge based on adaptive ev ent triggering is proposed, and its sta bility and conver gence are pro ved.

The control of battery energy storage systems (BESSs) plays an important role in the management of microgrids. In this paper, the problem of balancing the state-of-charge (SoC) of the networked battery units in a BESS while meeting the total charging/discharging power requirement is formulated and solved as a distributed control problem.

The authors in [30] design a distributed cooperative control scheme for the dynamic energy balancing between the energy storage devices to improve frequency regulation and reliability of microgrid. The authors in [31] use an adaptive droop control method to govern the SoC of each ESU in DC microgrid.

This paper presents a distributed hybrid energy storage system (HESS) for an island DC microgrid (MG) with a central superconducting magnetic energy storage (SMES) system and multiple distributed battery energy storage systems (BESS). A hierarchical cooperative control scheme is proposed to realize coordinate power sharing among distributed HESS and ...

The DC microgrid"s distributed energy storage adopts the droop control for voltage regulation and power distribution. ... The proposed distributed cooperative control of a DC microgrid cluster with multiple voltage levels connected by a MAB converter is validated on PLECS RT-Boxes which are hardware-in-the-loop (HiL) simulator and rapid ...

The approach to optimal control for distributed battery energy storage systems (BESS) has recently been closely investigated and implemented by numerous experts. ... A PSCAD/EMTDC simulation model of the BESU was developed in order to test and evaluate the distributed cooperative control of BESS based on the new modified droop control method ...

The control of battery energy storage systems (BESSs) plays an important role in the management of microgrids. In this paper, the problem of balancing the state-of-charge (SoC) of the networked battery units in a BESS while meeting the total charging/discharging power requirement is formulated and solved as a distributed control problem. Conditions on the ...

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Hybrid energy storage system (HESS) consisting of battery and supercapacitor (SC) is an effective approach to alleviate voltage stability problems brought by the fluctuation of renewable resources in a dc microgrid. This paper proposes a novel distributed control scheme for multiple HESSs based on a leaderless consensus protocol to realize the power splitting ...

Abstract: This article proposes an improved distributed cooperative control strategy for the energy storage system (ESS) in islanded dc microgrid. To meet the requirements of ...

The control of battery energy storage systems (BESSs) plays an important role in the management of microgrids. In this paper, the problem of balancing the state-of-charge (SoC) of the networked battery units in a BESS while meeting the total charging/discharging power demand is formulated and solved as a distributed control problem. Conditions on the ...

Considering the voltage stability and power sharing of MGC system, a distributed cooperative control method based on network topology optimisation for MGC is proposed to control the power flow of multi-microgrid system. Specially, preliminary Q-leaning algorithm is utilised with establishment of new adjacency matrices for the distributed ...

In order to solve the cooperative control problem of multiple battery storage units in a DC microgrid, this paper proposes a distributed secondary control strategy. The strategy includes dynamic load current allocation and bus voltage restoration. Firstly, a communication network among neighboring units is constructed at the communication layer to reduce the ...

A multiagent system (MAS)-based distributed control model, which contains a top layer communication network built by agents and a bottom-layer microgrid composed of BESSs, distributed generators, and Loads, is provided and has the fast convergent speed of SOC balancing of Besss, compared to the existed method.

The control of battery energy storage systems (BESSs) plays an important role in the management of microgrids. In this paper, the problem of balancing the state-of-charge (SoC) of the networked battery units in a BESS while meeting the ...

Therefore, battery-ultracapacitor hybrid energy storage system (HESS) will effectively suppress the fluctuations of the distributed power system and improve the power quality . Compared with the one type of ES system (e.g. only having batteries), HESS can increase the life span of the batteries .

The integration of numerous energy storage systems (ESSs) improves the reliable and economic operation of microgrids but also enlarges the burden of control and communication systems. This article proposes a cooperative hierarchical control for isolated microgrids with ESSs, which fully frees from the centralized paradigm and is therefore superior in flexibility and scalability. ...

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Nonlinear dynamics of loads in microgrid is not addressed by strategies in Refs. 62-65 Distributed cooperative control in gird-connected AC microgrid with feedback linearization is implemented to address the ... this essential quality is found in bulk generator systems. Hence, microgrid requires energy storage systems (ESSs) to solve the ...

Distributed Cooperative Control of Microgrid Storage Thomas Morstyn, Student Member, IEEE, Branislav Hredzak, Senior Member, IEEE, and ... Battery energy storage systems (BESS) can be used to ...

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