

Research on building a ship microgrid

Are ship microgrids a new energy source?

In summary, current studies on microgrids mainly focus on terrestrial new energy generation systems, whilst the research on ship microgrids is insufficient. This research status has become one of the restriction factors for the wider adoption of new energy sources in ships.

How to optimize the operation of a ship microgrid?

A two-stage robust optimization approach is proposed to robustly optimize the operation of the ship microgrid. A two-level column-and-constraint-generation (C&CG) algorithm is used to solve the optimization model. Increasing global greenhouse gas (GHG) emissions call for new operation strategies towards low-carbon marine transportation.

How a ship microgrid works?

While, the wind energy generation system is connected to the microgrid DC bus through the AC/DC inverter. Under normal working conditions, the ship microgrid is connected with ship main grid to supply the ship load.

Can hybrid propulsion systems reduce the cost of a ship microgrid?

Increasing global greenhouse gas (GHG) emissions call for new operation strategies towards low-carbon marine transportation. This paper proposes a coordinated operation strategy for a ship microgrid with hybrid propulsion systems (HPSs) to minimize the whole-voyage operation cost within GHG emission limitations.

How are hydrogen fuel cells integrated to a ship microgrid?

Hydrogen fuel cells are integrated to the ship microgrid for further reduction of GHG emissions. Purchase costs of fuel, hydrogen and electricity and degradation costs of fuel cells (FCs) and batteries are considered in the calculation of whole-voyage operation cost. The proposed coordinated operation strategy consists of two stages.

What are the best forecasting methods for microgrids?

A number of effective forecasting methods are available, including support vector machines (SVM), vector auto regression theory and Bayesian approaches with Monte Carlo simulation [122, 123]. In summary, current studies on microgrids mainly focus on terrestrial new energy generation systems, whilst the research on ship microgrids is insufficient.

The bus voltage of the ship DC microgrid is sensitive to the change of loads, which has an influence on the power supply quality. This paper introduces a hybrid energy storage system (HESS) that ...

Firstly, taking into account the characteristics of small capacity microgrid and AC load, a topology of ship AC microgrid is adopted, based on the state of charge (SOC) and net ...

Covering the whole spectrum of the microgrid research, we have been developing high-performance controllers, robust operation methods, and multi-stage coordinated planning frameworks for the microgrid. ...
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ship power systems, enables robust operation even during faults in part of the ship microgrid [34,35]. The aim of this paper is to present a review of the advancements of architectures, ...

The dataset is extracted from microgrid data of a research building in Tsukuba, Japan [52]. The dataset recorded the actual output power of a 90.84 kW PV system starting from 1 January 2015 to 24 ...

Aiming at the solid oxide fuel cell (SOFC) applied to the ship DC microgrid in the face of pulse load disturbance is prone to make the SOFC voltage drop too large leading to ...

This overview characterizes shipboard microgrids and several emerging technical challenges related to joint power and voyage scheduling, and elucidates prospects for further research, based on a comprehensive survey ...

In this paper, a multi-energy ship microgrid system is taken as an object, and a dual-mode switching technology is proposed to solve the problem of reliable switching under ...

Han et al. (2012) proposed that FC could be more efficient and fully integrated in all-electric ships. Pan et al. (2021) summarize research on the integration of ship power ...

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