

Why are trams with energy storage important?

Trams with energy storage are popular for their energy efficiency and reduced operational risk. An effective energy management strategy is optimized to enable a reasonable distribution of demand power among the storage elements, efficient use of energy as well as enhance the service life of the hybrid energy storage system (HESS).

What does a battery pack do on a tram?

As the sole power source of the tram, the battery pack can supply power to the traction system and absorb the regenerative braking energy during electric braking to recharge the energy storage system. The traction system mainly consists of the inverter, traction motor, gearbox, and axle.

How energy management strategy is used in Guangzhou Haizhu trams?

An improved PSO algorithm based on competitive mechanism is developed to obtain the optimal energy management strategy. The obtained energy management strategy has better effects in energy reduction with application in Guangzhou Haizhu tram. Trams with energy storage are popular for their energy efficiency and reduced operational risk.

Why are lithium batteries used in energy storage trams?

Compared with the traditional overhead contact grid or third-rail power supply, energy storage trams equipped with lithium batteries have been developed rapidly because of their advantages of flexible railway laying and high regenerative braking energy utilization.

What factors affect the longitudinal movement direction of a tram?

It can be seen that during the operation of the tram, its longitudinal movement direction is mainly affected by the traction/braking force, mechanical braking force, and total resistance, where the total resistance includes air resistance, gradient resistance, and curve resistance. Fig. 2.

Based on the existing operating mode of a tram on a certain line, this study examines the combination of ground-charging devices and energy storage technology to form a vehicle (with ...

Downloadable! A tram with on-board hybrid energy storage systems based on batteries and supercapacitors is a new option for the urban traffic system. This configuration enables the tram to operate in both catenary zones and catenary-free zones, and the storage of regenerative braking energy for later usage. This paper presents a multiple phases integrated optimization (MPIO) ...

The main traction power converter of a trams is connected to DC trolley wire by input LC filter. The tram input LC filter is almost undamped resonant circuit, which is often loaded by the motor constant torque command. Sources of the input LC filter oscillation may be present on the vehicle, typically drive control

influence. The source of LC filter excitation except the ...

Xu et al. (2018) designed a coasting optimization algorithm considering the regenerative braking energy for energy storage trams and solved the energy-efficient speed trajectory and operating energy consumption at a given time. ... (Tang and Feng, 2013). The tram line is composed of a series of nodes, ...

Uneven heat dissipation will affect the reliability and performance attenuation of tram supercapacitor, and reducing the energy consumption of heat dissipation is also a problem that must be solved in supercapacitor engineering applications. This paper takes the vehicle supercapacitor energy storage power supply as the research object, and uses computational ...

This paper investigates the benefits of using the on-board energy storage devices (OESD) and wayside energy storage devices (WESD) in light rail transportation (metro and tram) systems. The analysed benefits are the use of OESD and WESD as a source of supply in an emergency metro scenario to safely evacuate the passengers blocked in a metro train ...

Energy storage systems (ESSs) play a significant role in performance improvement of future electric traction systems. This paper investigates an ESS based on supercapacitors for trams as a ...

Electric vehicle (EV) is developed because of its environmental friendliness, energy-saving and high efficiency. For improving the performance of the energy storage system of EV, this paper proposes an energy management strategy (EMS) based model predictive control (MPC) for the battery/supercapacitor hybrid energy storage system (HESS), which takes ...

Compared with the traditional overhead contact grid or third-rail power supply, energy storage trams equipped with lithium batteries have been developed rapidly because of their advantages of flexible railway laying and high regenerative braking energy utilization. However, trams may face expensive battery replacement costs due to battery degradation.

NOTE: # Students Advised, * Corresponding Authors Journal Articles [J20] Yuzhen Tang #, Qian Xun, Marco Liserre, and Hengzhao Yang *, "Energy management of electric-hydrogen hybrid energy storage systems in photovoltaic microgrids," International Journal of Hydrogen Energy, vol. 80, pp. 1-10, 2024.[[J19] Jinyuan Zhang #, Qian Xun, Marco Liserre, and Hengzhao Yang ...

With the rapid development of AI algorithms in recent years, researchers begin to apply reinforcement learning (RL) and deep learning algorithms to the energy management of HESS. T. Liu [22] applied RL to the energy management of hybrid electric vehicles. Compared to the strategy of rule-based and stochastic dynamic programming (SDP) algorithm, the RL has ...

DOI: 10.2139/ssrn.4011129 Corpus ID: 246963764; A Two-Stage Stochastic Optimization Model for Integrated Tram Timetable and Speed Control with Uncertain Dwell Times @article{Li2022ATS, title={A

Two-Stage Stochastic Optimization Model for Integrated Tram Timetable and Speed Control with Uncertain Dwell Times}, author={Jiajie Li and Yun Bai and ...

This article focuses on the optimization of energy management strategy (EMS) for the tram equipped with on-board battery-supercapacitor hybrid energy storage system. The purposes of ...

Energy management strategy plays a decisive role in the energy optimization control of electric vehicles. The traditional rule-based and fuzzy control energy management strategy relies heavily on expert experience. In this paper, a genetic algorithm (GA)-optimized fuzzy control energy management strategy of hybrid energy storage system for electric vehicle ...

Abstract: This paper proposes an improved method to optimize the existing energy management strategy (EMS) of hybrid energy storage system (HESS) to improve the energy utilization rate of HESS of pure electric logistics vehicle. Firstly, the sensor is used to identify the road slope coefficient, and then the identified road slope coefficient is added to the input of the fuzzy ...

In recent years, the development of energy storage trams has attracted considerable attention. Our current research focuses on a new type of tram power supply system that combines ground charging devices and energy storage technology. Based on the existing operating mode of a tram on a certain line, this study examines the combination of ground ...

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