

The power density of electric machines for future battery electric vehicles must be further increased to improve customer benefits. To this end, this paper compares two state-of-the-art electrical traction machines and evaluates the potential for increasing the power density using a third, novel high-speed machine design. The analysis is performed using an ...

This paper proposes the application of high-voltage stator-cable windings in superconducting machines, based on the characteristics of strong magnetic fields and large air gaps. Cross-linked polyethylene cable winding can be employed to achieve a rated voltage of 35 kV in direct-current (DC)-field superconducting machines, thereby enabling a direct connection ...

Synchronous condenser (SC) technology and Battery Energy Storage Systems (BESS) complement each other in a hybrid configuration. This provides a range of grid-supporting functions, including black-start capability. Christian Payerl, Synchronous Condensers Expert, ABB ...

Permanent magnet elevator traction machine, also known as permanent magnet synchronous traction machine, is the core power component of elevators. ... By adopting this technology, especially in combination with the design of machine room free elevators, the energy consumption ratio of elevators in the entire building can be reduced from 5% to 3 ...

Compared with the traditional grid-connected PV power generation system, the energy storage PV grid-connected power generation system has the following features: 1) The energy storage device has an energy buffering effect so that the inverter output power does not have to be equal to the PV power, which not only reduces the fluctuation and intermittency of ...

The design and optimisation of a permanent magnet-assisted synchronous reluctance (PMaSynR) traction machine is described to improve its energy efficiency over a selection of driving cycles, when installed on a four-wheel-drive electrically powered vehicle for urban use, with two on-board powertrains.

magnet synchronous traction machine and the traditional asynchronous traction machine. With the people's growing demand for the reliability and comfort of the ... nology, have brought the advantages of high efficiency and energy saving, space saving (no machine room or small machine room), good dynamic performance and convenient maintenance ...

A permanent magnet synchronous machine has high power density and efficiency. ... present the modeling and control of an induction machine-based flywheel energy storage system for frequency ... subway as a Wayside Energy Storage System (WESS). It was reported that the system had saved 10 to 18% of the daily traction

energy. The LA metro ...

The battery is an energy storage system with high energy density and low power density, which is mainly used to suppress low-frequency components; The supercapacitor has a faster charging speed, higher energy ratio, low energy density, and long cycle life, so it is used to suppress high-frequency components.

The structure of permanent magnet synchronous gearless traction machine is compact and small in volume. Therefore, it can be used in a small space. However, the asynchronous geared traction machine is mainly suitable for elevators with cabin, which increases the building area and wastes public resources.

This paper proposes a new traction system with asymmetrical six-phase permanent magnet synchronous motors to replace traditional induction and permanent magnet machines for hydrogen trains.

Compared with other types of electrical machines, permanent magnet synchronous machines (PMSM) have high torque density, high power density, small losses, simple structure for the rotor, and then ...

Especially the energy storage equipment represented by electrochemical energy storage, which can quickly respond to the frequency fluctuation of the power grid through the way of energy storage-energy release, is expected to play more roles in guaranteeing power system stability ...

Hybridization with an appropriate energy storage. ... study of different stator-segmentation topologies of a permanent magnet synchronous machine (PMSM) used in traction drives and their effect on ...

This paper describes the design and analysis of a regenerative braking system for a permanent magnet synchronous motor (PMSM) drive for electric vehicle (EV) applications.

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Control Method of High-power Flywheel Energy Storage System Based on Position Sensorless Algorithm. Conference paper; First Online: 29 February 2024; ... when the permanent magnet synchronous motor is controlled, sensors need to be installed on the rotor to detect the position and speed of the rotor, which will undoubtedly increase the hardware ...

In flywheel based energy storage systems (FESSs), a flywheel stores mechanical energy that interchanges in form of electrical energy by means of an electrical machine with a bidirectional power converter. FESSs are suitable whenever numerous charge and discharge cycles (hundred of thousands) are needed with medium to high power (kW to ...

In this paper, the suitability of a class of electric machines for vehicle traction applications is discussed. These

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In this paper the suitability of a class of electric machines for vehicle traction application is discussed. These machines, known as hybrid excitation synchronous machines, combine a permanent ...

The power electronic converter supplies the electric machine with the necessary electric energy, taken from the energy source. For instance, in an electric vehicle, a power electronic converter ...

**Synchronous Machines** The SM with the advantages of high efficiency, high power density and low rotor losses has been widely used for high speed FESS applications [5]. ... 12. [10] Ali AsgharKhodadoostArani, BehroozZaker and Gevork B. Gharehpetian."Induction machine-based flywheel energy storage systems modelling and control for frequency ...

The advantage of this solution is the information of each synchronous machine in the MG is not required. ... It is the fast-acting energy storage that is able to damp electromechanical oscillations provided through kinetic energy from the generator rotor to mitigate sudden changes in power requirement .

The literature 9 simplified the charge or discharge model of the FESS and applied it to microgrids to verify the feasibility of the flywheel as a more efficient grid energy storage technology. In the literature, 10 an adaptive PI vector control method with a dual neural network was proposed to regulate the flywheel speed based on an energy optimization ...

Synchronous homopolar machines have been known for a long time and are used in various equipment such as generators in aircrafts and trains, welding inverters, and flywheel energy storage systems . Moreover, in [ 4, 5, 11, 15, 16 ], SHMs were presented as traction motors.

PDF | On Sep 1, 2018, L. Castellini and others published Design of a Synchronous Reluctance Machine for a Flywheel-Based Energy Storage System | Find, read and cite all the research you need on ...

In the field of new energy power generation, the virtual synchronous machine (VSM), which is a three-phase inverter and has external characteristics of the synchronous machine (SM), is used to solve this problem . As for electric locomotive, it is a special load; it can use and generate electricity.

The design, construction, and test of a high-speed synchronous homopolar motor/alternator, and its associated high efficiency six-step inverter drive for a flywheel energy storage system are presented in this paper. The work is presented as an integrated design of motor, drive, and controller. The performance goal is for power output of 30 kW at speeds from ...

Due to their numerous advantages, synchronous machines are used in a wide-range of applications, such as variable-speed wind power generation [1], and electrical traction systems [2], [3]. ...

The interior permanent-magnet synchronous machine (IPMSM) is currently often employed in electric vehicle technologies and its applications because of its very high ...

A novel DS-FSPM machine for EV applications is proposed in 21 and compared with a conventional double stator permanent magnet synchronous machine (DS-PMSM). Theoretical analysis and simulation ...

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