Synchronous traction machine energy storage

What is permanent magnet synchronous Gearless traction machine?
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.

Why are permanent magnet synchronous machines used in flywheel energy-storage systems?
Therefore,various machines are utilized in flywheel energy-storage systems to fulfill actual requirements [13,14]. Permanent magnet synchronous machines (PMSMs),as conventional machines,offer advantages such as high efficiency,high power density,low noise,and low vibration[15,16,17,18,19].

How does a asynchronous Geared traction machine work?
It can also be used as a generator to regenerate power when the elevator goes up with no load or when it goes down with rated load. The asynchronous geared traction machine uses an ordinary three-phase asynchronous motor. In order to generate a rotating magnetic field and electromagnetic force,the coil of stator and rotor needs to pass current.

Why is the operating efficiency of permanent magnet synchronous motor high?
Since rotor magnetic field of the permanent magnet synchronous motor is established by permanent magnets, the stator current does not need to excite the magnetic field. Therefore, the operating efficiency of permanent magnet synchronous motor is high.

What is the transmission efficiency of asynchronous Geared traction machine?
In order to generate a rotating magnetic field and electromagnetic force,the coil of stator and rotor needs to pass current. Due to the mechanical transmission structure in the transmission process,the transmission efficiency of asynchronous geared traction machine is only about 70%.

What is a permanent magnet synchronous machine (PMSM)?
Among various machine types,permanent magnet synchronous machines (PMSMs) are the most commonly used in FESSs,owing to their advantages of high efficiency and high power density (Li and Palazzolo,2022). A PMSM should apply an appropriate control strategy to achieve energy conversion in a FESS.

Pumped storage hydropower offers a critical solution for grid stability, especially with an increasing reliance on intermittent renewable energy sources. Variable-speed pumped ...

My research aims at developing a fast and reliable sizing tool for wound field synchronous machines for traction applications and at analyzing the motor performances from an ...

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The flywheel energy storage system (FESS) with no-load loss as low as possible is essential owing to its always running in no-load standby state. In this article, cup winding permanent ...

The design and optimization of a permanent magnet-assisted synchronous reluctance (PMaSynR) traction machine is described to improve its energy efficiency over a ...

Energy saving technologies in the railway vehicle traction field can be mainly categorized into two domains: reducing loss and increasing the regenerative energy. Energy saving technologies for ...

A flywheel energy storage system (FESS) achieves energy conversion through a permanent magnet synchronous machine (PMSM). The PMSM in a FESS requires low current ...

Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the ...

Electric vehicles (EVs) are considered as a new generation of transport to solve the energy crisis. The efficiency of permanent-magnet synchronous machine (PMSM) is an ...

This paper presents the design of a continuous control set model predictive control (CCS-MPC) for a permanent magnet synchronous machine (PMSM). The CCS-MPC is designed for the ...

The compact flat-type gearless traction machines are distinguished by their high efficiency, extremely low noise and the excellent operating characteristics of the three-phase synchronous ...

Abstract: The traction drive system is the "heart" of rail transit vehicles. The development of sustainable, secure, economic, reliable, efficient, and comfortable contemporary rail ...

The elevators system"s main components include the traction induction machine, the bidirectional converter coupled with the energy storage element, and the front-end ...

This paper presents a novel hybrid permanent magnet and electrically excited synchronous machine in a realistic scenario for traction application. This concept is well known since it ...

The existing energy storage systems use various technologies, including hydroelectricity, batteries, supercapacitors, thermal storage, energy storage flywheels,[2] and ...

The machine construction and its optimization specifically designed for electric vehicle (EV)/hybrid electric vehicle (HEV) traction applications are investigated.

The permanent magnet synchronous motor (PMSM) has recently garnered significant interest due to its high

efficiency, lightweight, and low life cycle cost, positioning it as a strong candidate for ...

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