Variable flux motor energy storage

What are variable flux memory Motors (vfmms)?
Abstract: Variable flux memory motors (VFMMs) are a relatively new class of machine that affords one the ability to actively change a motor from a high torque/low speed device into a low torque/high speed device through the online control. With regard to the method of controlling flux, VFMMs are categorized in this paper.

What is a variable-flux flux intensifying machine (VFM)?
The Variable-Flux Flux Intensifying machines are found to be the state-of-the-art VFM technology available to-date. The paper also reviews the magnetization process in VFMs and relates this with the B-H curve of the magnetic material. The conventional PM machine mathematical model is adapted to represent the operation of VFMs.

Does a VFM have a flux adjusting mechanism?
Therefore,novel topologies and flux-adjusting mechanisms of the VFM have been proposedin recent years,and the VFM not only has the advantages of the traditional permanent magnet (PM) motor but also can effectively adjust its internal magnetic field [6,7].

Do variable-flux machines offer new opportunities for improved machine design?
Modern applications demand challenging operation requirements from electrical machines. Variable-flux machine (VFM) concepts are found to offer new opportunities for improved machine design. This paper reviews the VFM technology.

What are mechanical-variable-flux PM machines?
Compared with electrical variable flux techniques,the mechanical-variable-flux PM machines (MVF-PMMs),which can adjust flux effectively and conveniently,are presented and studied.

Does MVF-IPM machine have a higher flux-weakening capability?
It can be seen that the MVF-IPM machine has a higher flux-weakening capabilitythan the conventional machine regardless of states. Table 4. Comparison of flux-weakening capabilities in the conventional and MVF-IPM machines The corresponding efficiency maps are shown in Fig. 13,where the maximum torque per ampere (MTPA) control strategy is adopted.

As a bidirectional energy storage system, a battery or supercapacitor provides power to the drivetrain and also recovers parts of the braking energy that are otherwise dissipated in conventional ICE vehicles. ...

Variable flux memory motors (VFMMs) are a relatively new class of machine that affords one the ability to actively change a motor from a high torque/low speed device into a low torque/high speed ...

traditional radial flux motors where the conductors are arranged axially, in case of axial flux motor the

electrical circuit- stator conductors and rotor bars are arranged radially because of topological changes. The working rule of axial flux induction motors is same as that of conventional radial flux induction motors[8].

A turbine includes: a variable flux memory motor (VFMM) generator that converts an input kinetic energy of the turbine to electrical power; and a controller. The controller: monitors a power load on the VFMM generator or the input kinetic energy of the turbine; receives a signal indicating a change in the power load or input kinetic energy of the turbine; and changes a magnetization ...

Therefore, the variable-flux (VF) PMSM, which can control the magnetic flux of the PM is widely studied. The magnetic flux of the PM is controlled by changing the magnetization state (MS) through the stator current. ... energy storage, and electric motor based on the data and reference of each component. 2) Calculation of operating points for ...

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To solve this problem, a novel mechanically adjusted variable flux permanent magnet homopolar inductor machine with rotating magnetic poles (RMP-PMHIM) is proposed in this paper. The permanent...

A hybrid stator type flux-switching bearingless permanent magnet memory motor (HSTFBPMM) was proposed; this not only solves the problem of friction in high-speed rotating machinery bearings, but also utilizes low coercivity permanent magnets such as aluminum, nickel, and cobalt that can be adjusted online by applying only instantaneous pulse currents, The true ...

A novel mechanical variable-leakage-flux interior permanent magnet machine (MVLF-IPMM) is proposed for electric vehicles (EVs) in this paper, which employs a mechanical flux-regulating device and ...

This paper proposes a novel variable flux memory motor (VFMM) with series hybrid magnets. The proposed motor adopts a new permanent magnet arrangement. ... Y. Zhou, Y. Chen, and J. X. Shen, "Analysis and Improvement of a Hybrid Permanent-Magnet Memory Motor," IEEE Transactions on Energy Conversion, vol. 31, no. 3, pp. 915-923, 2016.

This paper suggests design of variable flux motor for variable speed operation. The calculation method of electrical parameters to meet variable speed condition is suggested, and the basic motor shape is decided using the relationships between the calculated electrical parameters and motor geometry. The difference between corecivity of two types of magnet is used to control ...

This paper investigates the incorporation of multiphase (MP) and variable flux (VF) permanent magnet motors to electric vehicles (EVs). A literature review is carried out first, ...

An energy audit that helps to identify motor energy wastages have been discussed extensively. As motors are the major energy users, different energy savings strategies such as use of high-efficient motor, variable speed

drive (VSD), and capacitor bank to improve the power factor to reduce their energy uses have reviewed.

Variable-flux machine (VFM) concepts are found to offer new opportunities for improved machine design. This paper reviews the VFM technology. Three topologies, mainly the parallel hybrid...

Tsunata, R, Takemoto, M, Ogasawara, S & Orikawa, K 2019, A proposal of a delta-type salient pole variable flux memory motor having large flux barrier for traction applications. in 2019 IEEE Energy Conversion Congress and Exposition, ECCE 2019., 8913191, 2019 IEEE Energy Conversion Congress and Exposition, ECCE 2019, Institute of Electrical and Electronics ...

A Metaheuristic Approach to Analyze the Techno-Economical Impact of Energy Storage Systems on Grid-Connected Microgrid Systems Adapting Load-Shifting Policies ... "Dynamic Decoupled Current Control for Smooth Torque of the Open-Winding Variable Flux Reluctance Motor Using Integrated Torque Harmonic Extended State Observer" Processes ...

This paper investigates the decoupling and fast torque response for induction motor drives during vehicle operation with variable flux. A torque control method considering flux transient information is proposed, which takes the electromagnetic torque and reactive torque as state variables for modeling and feedback linearization control. Since the electromagnetic ...

To overcome this challenge, variable flux motors (VFMs) have recently been introduced as a high-speed alternative to permanent magnet motors. While extensive research has focused on the ...

Variable flux memory motors (VFMMs) are a relatively new class of machine that affords one the ability to actively change a motor from a high torque/low speed device into a low torque/high ...

Later in 1995, the largest variable-speed, pumped storage power plant was built in Ohkawachi, Japan and comprised two 395 MVA units that allowed operating at 330 to 390 rpm. This variable-speed generator-motor had a cylindrical rotor with three-phase winding similar to that of an induction motor.

Abstract: In this paper, we present a deep reinforcement learning (DRL) approach for optimizing the efficiency of variable flux motors (VFM) during a simulated drive cycle through flux control ...

In this paper, a novel FESS is proposed form the configuration, material and its structure, and driving motor.The novel FESS uses all metal materials to achieve a lower cost; Based on the barrel type, the dual hubs combined flywheel is adopted to reduce the mass and obtain higher energy storage; The switched flux permanent magnet motor (SFPM) is used as ...

Variable flux reluctance machines (VFRMs) are increasingly attracting research interest due to their magnetless and robust brushless structure. Under the modulation effect of the airgap permeance, the VFRM ...

Compared with electrical variable flux techniques, the mechanical-variable-flux PM machines (MVF-PMMs), which can adjust flux effectively and conveniently, are presented and studied. In [11], a rotor can be extruded in the axial direction according to the rotation speed to control the aligned length between the stator and rotor, and the air-gap ...

The present invention relates to a variable-flux motor comprising: a stator having stator coils; and a rotor disposed to be rotatable with respect to the stator with an air gap interposed therebetween, wherein the rotor comprises: a rotor core; a fixed magnet disposed along the radial direction of the rotor core, and of which one end portion is disposed adjacently to the air gap; and a ...

A. Takbash and P. Pillay, "Magnetization and Demagnetization Energy Estimation and Torque Characterization of a Variable-Flux Machine," in IEEE Transactions on Energy Conversion, vol. 33, no. 4, pp. 1837-1845, Dec. 2018.

LI et al. : ANALYSIS OF A NOVEL MECHANICALLY ADJUSTED VARIABLE FLUX PERMANENT MAGNET HOMOPOLAR INDUCTOR MACHINE WITH ROTATING MAGNETIC POLES FOR FLYWHEEL ENERGY STORAGE SYSTEM 317 Drive motor Gear Fixed shell Fixed Pedestal shell Rack Shell Shell Fig. 3. Permanent magnet rotating structure ...

Variable magnetic flux motors have been proposed to achieve high-efficiency operation over a wide drive range ranging from high torque to high-speed.

As a motor, the speed-regulating range is limited, so its application in the fields of electric vehicles, high-speed machine tools, and flywheel energy storage is limited. 5-7 Fortunately, in the last decade, a variable flux memory ...

It can be expected that a vehicle is driven by the HEM with less energy consumption owing to the variable field capability. Table I. Motor efficiency comparison. IPMSM HEM (Measured) HEM (3D-FEA) ... In this proposal, they ...

To solve this problem, a novel mechanically adjusted variable flux permanent magnet homopolar inductor machine with rotating magnetic poles (RMP-PMHIM) is proposed in this paper. The permanent magnet poles are rotated by an auxiliary rotating device and the ...

Now days, because of the advantages of disk-shaped structure of AFM, this topology is particularly suited for many applications such as wheel direct-drive motors [4], [5], [6], wind generators [1] and Flywheel energy storage systems [7]. For most modern industrial applications, the required features of electrical machines are as, proper shape ...

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