Demagnetization of lithium battery motor

How does demagnetization affect motor efficiency?
This means that higher motor speed areas start to be affected by the demagnetization. As the demagnetization level continues to be higher in Fig. 5 (e-f),the 0-1000 rpm low speed area suffers a maximum of 15% motor efficiency reduction. Whereas at the 5000-6000 rpm high speed area,the efficiency reductions are all less than 5%.

What happens if the motor demagnetization is 40%?
When the motor demagnetization is 40%,the maximum fuel increase is about 30%,which is 10% higher than the HEV case. The fuel performance under 20% demagnetization is also worse,with an 11% increase at top. Different driving cycles might perform different results.

Does demagnetization increase electricity consumption?
The total electricity consumption rises by maximum 30%when 40% demagnetization occurs. When the demagnetization is under 20%,the electricity consumption increase is less than only about 8%. The same NEDC driving cycle is used to test the HEV energy efficiency performance with different demagnetization levels,as shown in Fig. 7.

What causes demagnetization fault in permanent magnet synchronous motors (PMSMs)?
Due to possible overheat,abrasion or mechanical vibrations,demagnetization fault is inevitable in permanent magnet synchronous motors (PMSMs),which could greatly decrease the motor's efficiency and hence an electrified vehicle's performance.

How to understand motor efficiency variation when demagnetization fault happens?
In order to better understand the motor efficiency variation when demagnetization fault happens,various experiments have been conducted to imitate demagnetization. Most of them use permanent magnet demolition methodto achieve this target.

Can a simulated demagnetization fault cause efficiency reduction?
The simulated demagnetization faults can only cause about 5%efficiency reduction even when the demagnetization is as bad as 40% at the 3000-6000 rpm operating area. When the motor operates under 2000 rpm,the efficiency reduction is great and is nearly linear to the demagnetization degree.

To analyse the cause of local irreversible demagnetisation, the authors introduced an interior PMSM (IPMSM), consisting of a V-shaped magnet and concentrated winding, and performed a parameter analysis of the magnetic field based on the barrier width and magnet position considerably related to the magnetic path using the finite-element method.

By decomposing the flux density of each node within the magnets along its magnetization direction,

irreversible demagnetization can be accurately evaluated. Impacts ...

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1 · The findings indicate that the efficiency of the motor power converter based on an individual demagnetization circuit is 10-20% superior to that of the conventional power converter. The system is capable of maintaining CC and CV characteristics under battery load conditions, thereby ensuring safe and stable battery charging. Furthermore, no ...

This paper, from an energy efficiency point of view, proposes to analyze the tolerance ability of different electrified vehicles on motor demagnetization faults, via PMSM flux ...

This paper investigates the demagnetization effects of charging current on magnets in interior permanent magnet machines. By using numerical analysis and circuit-coupled simulation, the demagnetization effects during integrated charging are evaluated.

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DOI: 10.1109/IECON.2019.8926825 Corpus ID: 209319782; Modeling and Analysis of Demagnetization Faults in BLDC Motor using Hybrid Analytical-Numerical Approach @article{Usman2019ModelingAA, title={Modeling and Analysis of Demagnetization Faults in BLDC Motor using Hybrid Analytical-Numerical Approach}, author={Adil Usman and Bhakti M. ...

This paper investigates the irreversible demagnetization (ID) of a large capacity line-start permanent magnet synchronous motor (LSPMSM) considering influence of ...

This article presents the design and optimization of six-phase surface-mounted PM (SPM) and interior PM (IPM) motors with FSCW, considering the impact of PM demagnetization during IOBC. A detailed thermal and demagnetization analysis is conducted to identify the risk of PM demagnetization during propulsion and IOBC modes. The ...

In this motor design, the demagnetization of seven magnets (CD2) results in a spectral behavior of the investigated voltages and currents that closely resembles that of an undamaged motor, leading to poor anomaly ...

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Due to the high starting current and high temperature of the high voltage line-start permanent magnet synchronous motor, it is easy to cause partial demagnetization of the motor, which leads to increase vibration of the motor and seriously affects the operating stability of the motor. Therefore, a 10 kV, 630 kW prototype is used as an example to study the motor ...

Reliable fault diagnosis and condition monitoring are essential for permanent magnet synchronous motor (PMSM) drive systems with high-reliability requirements. PMSMs can be subject to various types of damage during ...

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