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Flux Sliding Mode Observer Design

Flux Sliding-mode Observer Design 3.1 Design of the observer To achieve the flux linkage ψ , the proposed observer as (10) is designed based on the stator current model (9). where, " $\hat{\cdot}$ " denotes the estimated quantities, $\text{sgn}(\cdot)$ is the sign function, K is the designed parameter, and the (10) is the conventional SMO.

Flux Sliding-mode Observer Design for Sensorless Control ...

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Abstract— A sliding-mode observer for the rotor flux and speed of an induction motor is presented in this paper. It is also proposed another observer that is a modification of the original one to reduce the errors and improve the obtained speed results. The observer is used in a sensorless Indirect Field Oriented Control (IFOC).

Design and implementation of a sliding-mode observer of ...

Abstract This paper proposes a novel fuzzy flux sliding-mode observer (FFSMO) with a phase-locked loop (PLL) for the sensorless speed and position tracking of permanent-magnet synchronous motors (PMSMs). The purpose of the novel FFSMO is to accurately estimate the position and velocity of the rotor.

A novel fuzzy flux sliding-mode observer for the ...

sliding-mode observer (SMO), namely, chattering phenomena and high-order

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harmonics, are discussed. These drawbacks affect the estimation accuracy of the SMO and reduce the control reliability of the system. To eliminate high-order harmonics, a flux SMO is designed by expanding the PMSM state equations with the

Design and performance analysis of an iterative flux ...

Industrial Application of a Second Order Sliding Mode Observer for Speed and Flux Estimation in Sensorless Induction Motor 3 As the mechanical position and magnetic variables are unknown, d –q frame is well appropriate for sensorless observer based control design.

Industrial Application of a Second Order Sliding Mode ...

In the estimation process, the flux SMO process is repeated four times, and its observer gain is gradually adjusted from a relatively large value to a relatively small value in each virtual current sampling step (i.e., $k_1 > k_2 > k_3 > k_4$).

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4) to ensure the reachability of the sliding mode and to avoid the chattering caused by overshoot issues. The computational speed of this system is highly dependent on the working frequency of the DSP microprocessor.

Design and performance analysis of an iterative flux ...

mode observer. The objective of SM-DTC design is to make the modulus of the rotor flux vector λ_r and torque track to their reference value and T^* respectively. Figure 1. Proposed Sliding Mode Direct Torque Control (SM-DTC) for Sensorless IM drives scheme. A. Design of the Sliding Mode Torque and Rotor Flux Controller

Sliding Mode Observer-based MRAS for Sliding Mode DTC of ...

The observer is insensitive to the variation of rotor resistance and perturbation when the states arrive at the sliding mode. Derivatives of rotor flux are obtained and designed as the

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state of MRAS, thus eliminating the integration.

Second-Order Sliding-Mode Observer With Online Parameter ...

Variable Structure Control (VSC) with sliding mode, or sliding mode control (SMC), is one of the effective nonlinear robust control approaches since it provides system dynamics with an invariance property to uncertainties once the system dynamics are controlled in the sliding mode.

INDUCTION MOTOR ROTOR SPEED OBSERVER USING SLIDING-MODE ...

In this paper, an interval sliding mode observer design method for uncertain systems is proposed. Uncertainty is assumed between a known minimum value and a maximum value. The observer is then constructed via a convex weighted sum of an upper estimator corresponding to the maximum value of the uncertainty and a lower estimator corresponding to the

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minimum value of the uncertainty.

Interval sliding mode observer design for linear and ...

Backstepping approach and high order sliding mode observer. That ensures. a high-performance control and a good dynamic in presence of inter-turn. short-circuit fault. The stability of the Backstepping control is proved by Lyapunov theory. A high order sliding mode observer is used for rotor flux.

High order sliding mode observerâ based backstepping ...

The design of sliding mode flux observer with the open loop speed estimator is given in Section 4. After that, Section 5 presents the association of the model reference adaptive system with SMO. Simulation results of the proposed control and estimation techniques together with their discussions are given in Section 6.

Feedback linearization based

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sensorless direct torque ...

Among different observation methods the sliding mode observer is a promising approach. This paper attempts to provide a status review and synopsis of the main approaches used in the sliding mode observer design for electric machines. Both induction machine and permanent magnet synchronous machine are covered in this paper.

Sliding mode observers for electric machines-an overview ...

- Brief overview of the observer idea
- The induction motor model
- Examples of flux and rotor speed observers – Observer architecture of Derdiyok, Guven, Rehman, Inanc and Xu (2002) – Sliding mode observer of Utkin, Guldner and Shi (1999)
- Our observer – Analysis – Simulation and experimental results
- Concluding remarks

Rotor Flux and Speed Observers for Induction Motors

Current Observer Design The proposed

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speed and rotor time constant estimation structures are based on a sliding-mode current observer. Ensuring the convergence of the current observer, the equivalent control is produced. Then, it is used in the flux estimation to determine the flux along d and q axes.

Design and implementation of a new sliding-mode observer ...

This paper presents a sliding mode observer (SMO) for robustly reconstructing faults affecting a class of nonlinear non-infinitely observable descriptor systems. Preliminary transformations are utilised to re-express the system such that the design freedom in its structure is easier to exploit. An infinitely observable system is formed by treating some states as unknown inputs.

A sliding mode observer for robust fault reconstruction in ...

Position control in electrical drives is a challenging problem which is

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complicated by sensor noise and unknown disturbances. This paper proposes a new cascade sensorless speed control technique for induction motor drives suitable for electric vehicle applications using the full-order adaptive Luenberger observer that is insensitive to measurement noise and parametric variation. The adaptive ...

Design of Robust Adaptive Observer against Measurement ...

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sliding mode controllers like GSMC and DSMC to make the system more stable and healthy was thought of sliding mode torque observer was used to reduce torque ripple. New SMTO based square

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currents control method and iterative learning compensation method was used. Miniaturization and high speed is easy to attain. The output power is higher.

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