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Co-Simulation of Sensor-less Predictive Control of a BLDC Motor using Sliding Mode Observer

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Abstract **–**This paper presents a novel approach for achieving sensor-less predictive control of a Brushless Direct Current (BLDC) motor using a Sliding Mode Observer (SMO). The increasing demand for efficient and reliable motor control systems has motivated the development of sensor-less techniques that eliminate the need for additional hardware sensors. The proposed method leverages the sliding mode observer's ability to estimate rotor position and speed, enabling the implementation of predictive control strategies. The predictive control scheme optimizes motor performance by anticipating future states and applying control actions accordingly.

The paper outlines the theoretical foundation of the sensor-less predictive control strategy, detailing the formulation of the sliding mode observer and its integration into the predictive control framework. The estimation accuracy of the SMO is assessed through simulation studies validations, demonstrating its effectiveness in accurately estimating rotor position and speed under varying operating conditions.

In conclusion, the proposed approach offers a viable solution for achieving sensor-less predictive control of BLDC motors, paving the way for more efficient and cost-effective motor control systems in various applications, ranging from industrial automation to electric vehicles [1-3].

Keywords – Sensor-less, Predictive Control, Brushless DC Motor, Sliding Mode Observer

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