



Simulation of Sensorless Position Control of a Stepper Motor with Field Oriented Control Using Extended Kalman Filter

Wahyuni Mary, Denny I, Adina Pratiwi^{1,2}

¹PT. Global, Department of Electrical and Electronic Engineering, IPST, Kuala Lumpur

²Universiti Pendidikan, Department of Electrical and Electronic Engineering, IPST, Kuala Lumpur

ABSTRACT Stepper motor are used for position control applications. The position control method that is typical design using either analog mechanical system is presented in this paper. Extended Kalman filter is used to estimate the measurement error and position control for the field-oriented control of the motor system. Extended Kalman filter algorithm estimates the state of the system from the current and voltage of the two phases of the field oriented control system. The controller is compared with the desired position and torque is applied at the desired position. Then in the aspect of mechanical system, the system is two degrees of freedom system and two independent variables in case of motor movement.

KEYWORDS Extended Kalman Filter, Field oriented control, Motor, FOC, Position control, Sensing system, Stepper motor

I. INTRODUCTION

With the advent of motor control it has enabled the applications including motion controlling. Motor drive such as brushless motor commonly considered in the past long time. In the current time control, position and speed of the motor need to be estimated. The use of estimator for measurement increases the cost, complexity and volume of the system. After the invention of the system is achieved in the aspect of measurement signals upon the existing system.

The estimator can be used to estimate the state variables of the system. The Kalman filter is an estimator which estimates the unobservable and non-measurable states of a system using a recursive algorithm. Kalman filter is also using extended Kalman filter algorithm. The current and voltage of the motor are used to estimate the speed and position for the extended Kalman filter algorithm. The advantage of the Kalman filter can be considered especially the field oriented control (FOC) improves the dynamic performance of motor system. The measurement error process support for sensorless motor movement by the FOC system.

II. BACKGROUND

Kalman filter and extended Kalman filter is used for state and non state systems respectively [1]. Even though extended Kalman filter has low computational cost but estimation error from extended Kalman filter the cost time implementation. Extended Kalman filter is presented [2]. The extended Kalman filter can be implemented in embedded low cost microcontroller. The cost time implementation for the motor Kalman filter is used to get the experimental level of measurement of motor speed controlling the effect of sensorless motor system is presented.

Simulation Of Sensorless Position Control Of A Stepper

Judd E. Hollander



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