



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

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ABSTRACT Stepper motor are used for position control applications. The position control method that is typical design using closed loop 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 provides the rate of the system from the current and voltage of the two phases of the field oriented control system. The controller is compared with the closed-loop control and torque is applied at the desired position. This is the effect of mechanical system, the system is less sensitive and less expensive. Simulations are done in MATLAB/SIMULINK.

KEYWORDS Extended Kalman Filter, Field oriented control, Motor, IIR, Position control, Sensitivity control, Stepper motor.

I. INTRODUCTION

With the advent of motor control it has enabled the applications including motion controlling. It does not need the extra cost because compared to the open loop system. In the closed loop control, position and speed of the motor need to be measured. The use of estimator for measurement reduces the cost, complexity and volume of the system. After the estimation of the system is achieved in the context 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. Sometimes called a state 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. This technique of the motor control can be controlled separately the field oriented control (FOC) algorithm. The dynamic performance of stepper motor. The measurement error profile against the measurement error corrected by the EKF algorithm.

II. BACKGROUND

Kalman filter and extended Kalman filter is used for linear and non-linear systems respectively [1]. Even though extended Kalman filter has low computational cost but estimation error from extended Kalman filter the cost that approximation. Extended Kalman filter is presented [2]. The extended Kalman filter can be implemented as nonlinear state [3] and discrete time. The cost that approximation due to the linear Kalman filter is used during the experimental level of measurement of motor speed controlling the effect of sensor feedback loop is presented.

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