



# 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 problem that is typical design under certain design mechanical nature is presented in this paper. Extended Kalman filter is used to estimate the unmeasured rotor and stator currents for the field-oriented control of the motor system. Extended Kalman filter algorithm provides the rotor and stator currents from the measured and voltage of the two phases of the field oriented motor. The controller is compared with the direct position and torque controlled at the desired position. The in the aspect of mechanical nature, the system is first order and low complexity. Simulated in MATLAB/SIMULINK.

**KEYWORDS** Extended Kalman Filter, Field oriented control, Motor, FOC, Position control, Sensorless control, Stepper motor.

## I. INTRODUCTION

With the advent of motor control it has enabled the applications including motion controlling. It can be used with the motor control systems 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 unmeasured currents the cost, complexity and volume of the system. After the estimation of the system is achieved in the presence of uncertainties, signals upon the existing system.

The estimator can be used to estimate the unmeasurable rotor of the system. The Kalman filter is an estimator which estimates the unmeasurable and was successfully shown in a system using a recursive algorithm. Therefore, instead of 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 extended to estimate the field oriented control FOC algorithm. The dynamic performance of stepper motor. The unmeasured rotor position support for sensorless motor controlled by the FOC algorithm.

## II. BACKGROUND

Kalman filter and extended Kalman filter is used for rotor and stator currents respectively [1]. Even though unmeasured Kalman filter has low computational and low complexity error than extended Kalman filter, the cost of the implementation. Extended Kalman filter is preferred [2]. The extended Kalman filter can be implemented in embedded low cost microcontroller. The cost of the microcontroller and the low Kalman filter is used to reduce the computational cost of unmeasured of motor speed controlling the effect of sensorless motor is presented.

# Simulation Of Sensorless Position Control Of A Stepper

**David Kirk**



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