ABSTRAK

Rogate Philia Putra Sitompul: *Pemodelan Dan Simulasi Sistem Kendali Kecepatan Motor Induksi Tiga Fasa Menggunakan Fuzzy Logic Control*. Skripsi. Fakultas Teknik Universitas Negeri Medan, 2024.

Pengaturan kecepatan motor induksi tiga fasa tergolong sulit, salah satu penyebabnya adalah pembebanan. Pemberian beban membuat motor tidak dapat mempertahankan kecepatan. Sistem kendali dibutuhkan agar dapat mengendalikan kecepatan motor sesuai kondisi. Metode kendali konvensional yang umum digunakan memiliki kekurangan dalam menangani perubahan kondisi kerja. Metode kontrol adaptif diperlukan untuk mengatasi kekurangan tersebut. Tujuan penelitian ini untuk memodelkan sistem kendali kecepatan motor induksi tiga fasa agar bekerja sesuai kondisi. Metode *vector control* dan *fuzzy logic control* digunakan untuk memodelkan sistem kendali kecepatan motor induksi. Sistem kendali di uji melalui simulasi pada empat kondisi untuk mengetahui kriteria respon sistem seperti *rise time, settling time, overshoot* dan *error steady state*. Hasil penelitian menunjukkan sistem kendali terdiri dari komponen blok motor induksi dan blok inverter, rangkaian kontrol menggunakan metode *vector control* dan *speed controller* dengan *fuzzy logic control.* Rangkaian *speed controller* bekerja untuk menghasilkan sinyal torsi elektromagnetik yang harus dihasilkan motor induksi. Rangkaian *vector control* akan menghitung besar arus untuk membangkitkan torsi agar mampu menangani beban motor. Hasil simulasi menujukkan bahwa sistem kendali dapat bekerja pada tiap kondisi. *Fuzzy output scaling factor* paling baik memiliki *rise time* ≤0,1 detik , *settling time* ≤0,1 detik , *overshoot* <1,5% dan *error steady state* <1%.

Kata Kunci: Motor Induksi, Kecepatan motor, Pemodelan, *fuzzy logic, vector control*

ABSTRACT

Rogate Philia Putra Sitompul*: Modeling and Simulation of a Three-Phase Induction Motor Speed Control System Using Fuzzy Logic Control. Thesis. Medan State University Faculty of Engineering, 2024.*

Regulating the speed of a three-phase induction motor is relatively difficult, one of the reasons is loading. Giving a load makes the motor unable to maintain speed. A control system is needed to be able to control motor speed according to conditions. Commonly used conventional control methods have shortcomings in dealing with changing working conditions. Adaptive control methods are needed to overcome these shortcomings. The aim of this research is to model a three-phase induction motor speed control system so that it works according to conditions. Vector control and fuzzy logic control methods are used to model the induction motor speed control system. The control system was tested through simulation in four conditions to determine the system response criteria such as rise time, settling time, overshoot and stable state error. The research results show that the control system consists of components of an induction motor block and an inverter block, a control circuit using a vector control method and a speed controller with fuzzy logic control. The speed control circuit works to produce an electromagnetic torque signal that must be produced by the induction motor. The vector control circuit will calculate the large current to generate torque to be able to handle the motor load. The simulation results show that the control system can work in every condition. The best fuzzy output scaling factor has a rise time ≤0.1 seconds, settling time ≤0.1 seconds, overshoot <1.5% and steady state error <1%.

Keywords: Induction motor, motor speed, modelling, fuzzy logic, vector control.