

ABSTRACT

In the era of rapidly advancing technology, the efficiency of control systems in Permanent Magnet Synchronous Motors (PMSM) has become crucial, especially in rehabilitation robots. This research is initiated to address challenges arising in enhancing the response and stability of PMSM control systems. The primary focus of the study is to implement Field-Oriented Control (FOC) on PMSM. The implementation steps involve simulation using PSIM software and hardware application using BTS7960. Through this research, it is expected to discover innovative solutions to improve the performance of PMSM control systems, particularly in dealing with load variations.

The research methodology consists of two main stages. First, simulation using PSIM software begins by employing PSIM as a simulation tool for PMSM control. Second, hardware implementation using BTS7960 involves selecting BTS7960 as the hardware to control the PMSM. By integrating these two steps, the research aims to enhance the response and stability of PMSM control systems through FOC implementation with optimal configuration on the hardware.

The results of the research with FOC control implementation on PMSM show an improvement in system response, particularly in reducing settling time from 0.52 to 0.36 under a 10-gram load. Despite facing challenges such as magnetic vibration (cogging) and lack of current data, this research successfully provides solutions and guides the development of PMSM control systems. The conclusion of this research emphasizes that FOC control, especially with parameter optimization and hardware implementation, can deliver better performance compared to open-loop methods.

Keywords: Field Oriented Control, Permanent Magnet Synchronous Motor, BTS7960.