Nonlinear Dynamics and Systems Theory, **15** (2) (2015) 148–162

A Fractional Order $PI^{\alpha}D^{\beta}$ Control of the Nonlinear Systems

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Received: July 16, 2014; Revised: April 3, 2015

Abstract: This paper studied the implementation of fractional order $PI^{\alpha}D^{\beta}$ controller for the control of an induction motor (IM). The perfection of the system performance in terms of response time and robustness is illustrated by adjusting the fractional order integral action and derivative action. A comparative study with a conventional PID controller is carried out. The observer is simple and robust, and suitable for online implementation for induction motor. Simulation tests under load disturbances and parameter uncertainties are provided to evaluate the consistency and performance of the proposed control technique.

Keywords: *conventional controller; fractional order controller; induction motor IM; electromagnetic torque and flux control.*

Mathematics Subject Classification (2010): 26A33, 93C10.

1 Introduction

The conventional PID controller is widely used in automatic and especially in industry because of its simplicity but due to the complexity of the controlled systems and parametric variations, the PID controller can not reach the desired performance control where the use of fractional order controller with integral action and derivative action, non-integer order.

The fractional order $PI^{\alpha}D^{\beta}$ controller is an improved version of the conventional PID controller. It allows two degrees of freedom to better adjust the dynamic properties

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