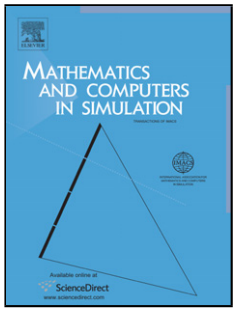


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# Adaptive Synchronization Method for Chaotic Permanent Magnet Synchronous Motor

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**Abstract**

This paper proposes a simple adaptive synchronization method for a chaotic permanent magnet synchronous motor (PMSM). Convergence of the closed-loop system responses is shown by using a Lyapunov function. The proposed adaptive synchronization method does not require any information on the PMSM parameter and load torque values. Simulation results are given to verify that the proposed method can be successfully used for digital implementation and it gives an effective means for adaptive synchronization of a chaotic PMSM under model parameter and load torque variations.

*Keywords:* Chaos, permanent magnet synchronous motor (PMSM), adaptive synchronization, uncertainty, Lyapunov stability

## 1. Introduction

Because chaos can be encountered in many fields such as medicine, biology, economy, and engineering, synchronization and control of chaotic systems has been studied by many researchers [1, 2, 3, 5, 6, 8, 9, 10, 11, 13, 12, 17, 20, 23, 25, 26, 28]. Chaos control is to remove chaotic behav-