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Intelligent Fault Monitoring and Diagnosis in Electrical Machines *

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Abstract

The aim of this paper is to develop an intelligent diagnosis method for fault detection and isolation in induction motors. We consider failures in three components of induction motor: bearing, stator winding and rotor winding. Firstly, a model-based nonlinear observer in the proposed method is designed based on available information. The fault detection decision is carried out by comparing the model-based observer speed with their signatures. Secondly, multiple state observers are constructed based on possible fault function set. The fault isolation decision is made by checking each residual generated by observer state estimation. Finally, simulation tests are given to verify the effectiveness of the proposed fault diagnosis scheme.

Key words: Fault monitoring; induction motor, nonlinear systems

1 Introduction

The induction motor is indispensable because of its ruggedness and low cost. Advances in power electronics and the field orientation design methodology promise that induction motor will replace dc motor. An important problem in industrial servo system is to continually monitor induction motor and detect changes whenever they occur. This paper will focus on this area.

Various approaches to fault detection have been reported during the last two decades. It has been shown that the use of adequate process models can allow early fault detection with normal measurable variables [1]. In [2], an expert system model is developed for fault detection. In [3], the authors develop a

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