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数控系统故障的ANN与专家诊断系统的研究及应用

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STUDY AND APPLICATION OF CNC SYSTEM FAULT DIAGNOSIS BASED ARTIFICIAL NEURAL NETWORKS AND EXPERT SYSTEM

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摘要

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摘要 分析了CNC系统的故障特点, 针对FANUC 7数控系统, 建立并比较了适用于CNC故障的BP和BAM两种ANN诊断模型, 探讨了模糊神经网络在CNC故障诊断中的应用, 给出了模糊ANN识别MACS 500数控机床伺服系统故障的数据和结果; 介绍了所开发的CNC系统故障诊断专家系统CNC-DES的总体结构、知识表达与推理等, 列举了该系统应用于CNC故障诊断的情况和结论。

关键词: 数控系统 故障诊断 神经网络 专家系统

Abstract: By analyzing the characteristics of CNC fault diagnosis and in the view of FANUC 7 CNC system, this paper establishes and compares two kinds of fault diagnosis ANN—the bidirectional associative memory (BAM) and back propagation (BP), which are suitable for CNC system fault diagnosis. The results show that both methods have special virtue. Through a complement of each other to form an integrated model, the fault diagnosis system will be more efficient. Furthermore, the application of Fuzzy Neural Network in CNC fault diagnosis is discussed. Applying Fuzzy Neural Network to recognize MACS 500 CNC system fault as an example, the validity and feasibility of this method are proved. At the same time, the framework of CNC diagnosis expert system (CNC DES) developed here and several relatively key techniques are introduced, such as the object oriented knowledge representation, the diagnosis reasoning mechanism and the case based reasoning. Additionally, this paper describes the situation of applying this system to CNC system fault diagnosis.

Keywords: CNC system fault diagnosis artificial neural network expert system

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