

过程系统工程

化工过程混合故障诊断系统的应用

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摘要

故障诊断是保障化工过程安全、平稳进行的一个重要工具。主成分分析法(PCA)作为典型的故障诊断方法,已经广泛应用于各类化工过程的故障诊断,但在复杂过程的故障类别判断上还存在不足。而人工免疫系统对于自我-非我的识别能力有助于对故障类别的判断,并且其良好的自适应、自学习能力,有助于在诊断过程中对系统的完善和改进。本文将主成分分析法与人工免疫系统结合,建立了一个新的混合故障诊断系统,实现对于化工过程故障的早期诊断,并用Honeywell公司的UniSim平台建立了一个动态的化工过程模型,对该诊断系统进行了验证。

关键词

[故障诊断](#) [化工过程](#) [主成分分析法](#) [人工免疫系统](#) [混合系统](#)

分类号

Application of hybrid diagnostic system for chemical processes

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Abstract

Fault diagnosis is an important method to insure the safety and stability of chemical processes. Principle component analysis (PCA), one of the typical diagnostic methods, has been widely used in various chemical fault detections. However, PCA is not good at fault diagnosis of complex chemical processes. Artificial immune system (AIS) is an adaptive system inspired by theoretical immunology and observes immune functions, principles and models. Based on the principles of self/non-self discrimination in the immune system, fault diagnosis by using AIS is feasible. The ability of self-learning and self-adaptation makes AIS able to evolve during the online applications. A hybrid diagnostic system combining PCA and AIS was proposed in this paper for early fault diagnosis of chemical processes. A dynamic chemical simulation model was built with Honeywell's UniSim platform, and the efficiency of the diagnostic system was validated.

Key words

[fault diagnosis](#) [chemical process](#) [principle component analysis](#) [artificial immune system](#) [hybrid system](#)

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