反应堆工程

基于数据融合的核动力装置故障诊断方法

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摘要　　数据融合作为一种处理多源信息的方法适合于核动力装置的故障诊断。利用数据融合信息分级处理的思想，将核动力装置故障诊断分为3级进行，数据级采用了数据挖掘的方法对数据进行处理，对属性进行约简；特征级采用并行的3个神经网络处理数据级的约简属性，并将其输出作为决策级 Dempster-Shafer(D-S)证据理论的基本概率赋值；决策级采用了改进的D-S证据理论对神经网络的输出进行合成，克服了传统D-S证据理论无法处理冲突信息的缺陷。运用文献中的相关数据对该方法进行了测试验证，测试结果证实了该方法可正确诊断训练过的核动力装置相关故障，具有一定的应用价值。

关键词　　核动力装置　故障诊断　数据融合

分类号

Nuclear Power Plants Fault Diagnosis Method Based on Data Fusion

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Abstract The data fusion is a method suit for complex system fault diagnosis such as nuclear power plants, which is multisource information processing technology. This paper uses data fusion information hierarchical thinking and divides nuclear power plants fault diagnosis into three levels. Data level adopts data mining method to handle data and reduction attributes. Feature level uses three parallel neural networks to deal with attributes of data level reduction and the outputs of three networks are as the basic probability assignment of Dempster-Shafer (D-S) evidence theory. The improved D-S evidence theory synthesizes the outputs of neural networks in decision level, which conquer the traditional D-S evidence theory limitation which can't dispose conflict information. The diagnosis method was tested using correlation data of literature. The test results indicate that the data fusion diagnosis system can diagnose nuclear power plants faults accurately and the method has application value.

Key words nuclear power plant fault diagnosis data fusion

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