

反应堆工程

基于邻域粗糙集和决策树算法的核电厂故障诊断方法

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摘要 核动力装置系统复杂, 需要采集和监测的变量较多, 这给装置故障诊断增加了困难。针对该问题提出基于邻域粗糙集的参数约简算法, 该算法实现了实数空间的粒度计算, 可直接处理数值型参数, 无需离散化参数。在此基础上, 采用决策树算法对核电厂的失水事故、给水管道破裂、蒸汽发生器U形管破裂和主蒸汽管道破裂等4种典型故障进行训练学习, 并将诊断决策结果与支持向量机算法进行对比。仿真结果表明, 该算法可快速、准确地诊断出核电厂上述故障。

关键词 [核动力装置](#) [故障诊断](#) [邻域粗糙集](#) [决策树](#)

分类号

Fault Diagnosis Method for Nuclear Power Plant Based on Decision Tree and Neighborhood Rough Sets

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Abstract Nuclear power plants (NPP) are very complex system, which need to collect and monitor vast parameters. It's hard to diagnose the faults. A parameter reduction method based on neighborhood rough sets was proposed according to the problem. Granular computing was realized in a real space, so numerical parameters could be directly processed. On this basis, the decision tree was applied to learn from training samples which were the typical faults of nuclear power plant, i.e., loss of coolant accident, feed water pipe rupture, steam generator tube rupture, main steam pipe rupture, and diagnose by using the acquired knowledge. Then the diagnostic results were compared with the results of support vector machine. The simulation results show that this method can rapidly and accurately diagnose the above mentioned faults of the NPP.

Key words [nuclear power plants](#) [fault diagnosis](#) [neighborhood rough sets](#) [decision tree](#)

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