

反应堆工程

# 集成神经网络方法在蒸汽发生器故障诊断中的应用

周刚; 杨立

海军工程大学 船舶与动力学院, 湖北 武汉 430033

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**摘要** 针对蒸汽发生器传统故障检测与诊断方法的不足, 提出了基于集成神经网络的蒸汽发生器故障检测与诊断的新方法。该方法采用两个神经网络。一个神经网络作为蒸汽发生器的动力学模型, 用于蒸汽发生器的重要运行参数的预测, 其原理是通过检测蒸汽发生器运行参数监测信号值与相应的蒸汽发生器神经网络模型预测值之间的偏差来确定是否发生了异常, 如果某一参数偏差超过了预先给定的极限, 就认为发生了异常。另一个神经网络作为故障分类模型, 用以对蒸汽发生器故障进行分类, 给出故障的类型。由两个神经网络监测和诊断结果的融合给出蒸汽发生器故障较为清晰的信息。仿真结果表明, 该方法能够提高蒸汽发生器监测与诊断的能力。

关键词 [核动力蒸汽发生器](#) [集成神经网络](#) [异常监测](#) [故障诊断](#)

分类号

## Application of Integrated Neural Network Method to Fault Diagnosis of Nuclear Steam Generator

ZHOU Gang, YANG Li

College of Naval Architecture and Power, Naval University of Engineering, Wuhan 430033, China

**Abstract** A new fault diagnosis method based on integrated neural networks for nuclear steam generator (SG) was proposed in view of the shortcoming of the conventional fault monitoring and diagnosis method. In the method, two neural networks (ANNs) were employed for the fault diagnosis of steam generator. A neural network, which was used for predicting the values of steam generator operation parameters, was taken as the dynamics model of steam generator. The principle of fault monitoring method using the neural network model is to detect the deviations between process signals measured from an operating steam generator and corresponding output signals from the neural network model of steam generator. When the deviation exceeds the limit set in advance, the abnormal event is thought to occur. The other neural network as a fault classifier conducts the fault classification of steam generator. So, the fault types of steam generator are given by the fault classifier. The clear information on steam generator faults was obtained by fusing the monitoring and diagnosis results of two neural networks. The simulation results indicate that employing integrated neural networks can improve the capacity of fault monitoring and diagnosis for the steam generator.

**Key words** [nuclear steam generator](#) [integrated neural networks](#) [anomaly monitoring](#) [fault diagnosis](#)

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