

EEMD 多尺度熵和 LSSVM 在模拟电路故障诊断中的应用

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摘 要: 针对模拟电路故障信号的非线性、非平稳性的特点, 提出一种基于集合经验模态分解结合多尺度熵和最小二乘支持向量机的模拟电路故障诊断方法. 该方法中, 首先利用集合经验模态分解算法对输出响应信号进行分解, 得到固有模态分量. 然后求出各分量的多尺度熵并构造故障特征向量. 最后将故障特征向量输入 LSSVM 分类器中进行检测. 实验结果表明, 该方法可以有效地提取模拟电路故障特征信息, 能够实现模拟电路故障的精确诊断.

关键词: 模拟电路; 故障诊断; 集合经验模态分解; 多尺度熵; 最小二乘支持向量机

Application of EEMD multi-scale entropy and LSSVM in analog circuit fault diagnosis

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Abstract: Aiming at the nonlinearity and nonstationarity of analog circuit fault signals, a fault diagnosis method based on ensemble empirical mode decomposition (EEMD) combined with multi-scale entropy and least square support vector machine (LSSVM) is proposed. In this method, the set empirical mode decomposition algorithm is used to decompose the output response signal to get the intrinsic mode components, then the multi-scale entropy of each component is obtained and the fault eigenvectors are constructed. Finally, the fault eigenvectors are input into LSSVM classifier for detection. The experimental results show that this method can effectively extract fault feature information of analog circuits, and achieve accurate fault diagnosis of analog circuits.

Key words: analog circuit; fault diagnosis; ensemble empirical mode decomposition; multi-scale entropy; least square support vector machine

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