用谱半径和迹实现模拟电路故障诊断与参数辨识

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摘　要： 为解决模拟电路参数辨识困难和故障诊断成本高的问题，提出一种基于矩阵的迹和谱半径的模拟电路故障诊断和参数辨识方法.该方法以矩阵理论为支撑，把被测电路输出电压的时间序列组成响应矩阵，以响应矩阵的谱半径和迹随被诊断器件参数的变化而变化的对应关系为基础，建立了故障模型.该模型将故障检测、故障定位和参数辨识一体化处理，具有易于工程实施的优点，解决了基于数字信号处理与人工智能的方法难以实现模拟电路故障参数辨识的不足.实验结果表明该方法的故障定位和故障参数辨识精度高，计算时间开销小，测试成本低.

关键词： 模拟电路；故障诊断；参数辨识；谱半径；迹

Using Spectral Radius with Trace to Achieve Fault Diagnosis and Parametric Identification for Analog Circuits

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Abstract： To realize the parameter identification and reduce the fault diagnosis cost of analog circuits, a methodology on fault location and parameter identification method for analog circuits based on the spectral radius and trace is proposed. Applying of matrix theory, the fault diagnosis model is established according to the correspondence between the fault device parameter variations and the change of the spectral radius and trace of response matrix of circuit under test (CUT). The fault detection, fault localization and parameter identification are integrated into one framework, so, the proposed method has the characters of low test cost and easy implementatiom. Experimental results show that this method is effective and the fault diagnosis accuracy and computational time overhead are satisfactory.

Key words： analog circuit; fault diagnosis; parameter identification; spectral radius; trace

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