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Fault diagnosis of switched current circuit based on wavelet transform and support vector machine. (Chinese. English summary) [Zbl 1374.94967]

Summary: For more accurate diagnosis and location of faults in switched current circuits, a new fault-diagnosis approach is proposed based on wavelet transform and particle swarm optimization (PSO) support vector machine (SVM). Monte Carlo analysis is applied to node current signals. Wavelet decomposition, fractal dimension calculation and kernel principal component analysis (KPCA) are used to abstract optimal fault features and reduce signal redundancy. Finally, the classification of various failure modes is accomplished by PSO-SVM. A 100% accuracy of fault diagnosis is obtained in simulation experiments for verification done with a sixth-order Chebyshev low-pass filter. Compared with other approaches, the proposed approach is superior with the support of the experimental results.

MSC:
94C12 Fault detection; testing in circuits and networks
94C10 Switching theory, application of Boolean algebra; Boolean functions (MSC2010)
42C40 Nontrigonometric harmonic analysis involving wavelets and other special systems
68T05 Learning and adaptive systems in artificial intelligence

Keywords:
switched current circuit; fault diagnosis; wavelet transform; kernel principal component analysis; particle swarm support vector machine

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