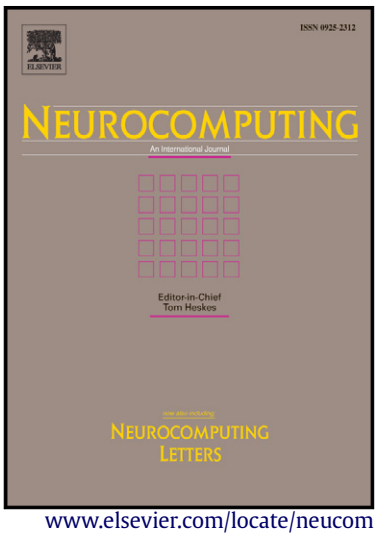

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Material identification of loose particles in sealed electronic devices using PCA and SVM

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Abstract

The existence of loose particles left inside the sealed electronic devices is one of the main factors affecting the reliability of the whole system. It is important to identify the particle material for analyzing their source. The conventional material identification algorithms mainly rely on time, frequency and wavelet domain features. However, these features are usually overlapped and redundant, resulting in unsatisfactory material identification accuracy. The main objective of this paper is to improve the accuracy of material identification. First, the principal component analysis (PCA) is employed to reselect the nine features extracted from time and frequency domains, leading to six less correlated principal components. And then the reselected principal components are used for material identification using support vector machine (SVM). Finally, the experimental results show that this new method can effectively distinguish the type of materials including wire, aluminum and tin particles.

Keywords: Loose particle; material identification; acoustic emission; principal component analysis; support vector machine; sealed electronic device.

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