

过程系统工程

电厂过程监测与故障诊断的一种MSPC方法

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收稿日期 2008-4-15 修回日期 网络版发布日期 2008-7-15 接受日期

摘要

讨论了大型电站具有随机时变特性过程的状态监测与故障诊断。基于多变量统计过程(MSPC)理论的主元素分析(PCA)技术,分辨故障事件的原因与结果。为适应随机时变特性的过程特点,将典型的PCA与改进的递推和快速滑动窗型PCA算法进行了比较。给出了递推快速滑动窗型算法(MWPCA),通过与典型的PCA算法在故障诊断应用中的比较,表明了新算法对过程特性变化的自适应能力和计算效率。给出了在现代电站过程中应用FMWPCA算法将诊断与过程特性变量结合的图示方法应用实例。

关键词

[随机系统](#) [过程监控](#) [主元素分析](#) [电厂](#)

分类号

An approach to using MSPC for power plant process monitoring and fault diagnosis

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Abstract

The monitoring and fault diagnosis of large-scale power plant processes that exhibit non-stationary and/or time-varying behavior were discussed. The work considered statistically-based monitoring technique, which was related to the multivariate statistical process control (MSPC) framework. Particular focus is on principal component analysis (PCA), as this technique allows distinguishing between cause and effect variables consequently. To demonstrate the difficulties of monitoring processes with non-stationary and time-varying behavior, the use of conventional PCA was compared with its recursive and fast moving-window counterparts. A recently proposed recursive moving window technique was employed because of its ability in adapting to process changes and its computational efficiency. The advance in fault detection was demonstrated by comparing fast moving-window PCA (MWPCA) with the conventional PCA. In addition, this paper proposes to plot the scaled variables in conjunction with fast MWPCA for fault diagnosis, which proves to be effective in power utility process application.

Key words

[stochastic system](#) [procession monitoring](#) [principal component analysis](#) [power plant](#)

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