



# 「MT法を用いたFFT重心監視」による 信号監視システムの提案

## *Proposed Spectral Centroid Signal Monitoring System Using Mahalanobis-Taguchi Method*

鈴木 真人\*

*Masato Suzuki*

To construct a signal monitoring system that detects changes in the condition of a source of sound, vibration, or the like from a signal obtained from the source, after FFT processing of the observed signal, the MT method was applied to the centroid of the resulting spectrum. The centroid can be defined by two-dimensional coordinates (frequency, power) and Mahalanobis distances can be calculated easily from the centroid coordinates. It was confirmed that changes in the condition of the signal could be readily recognized by this method. When the signal being monitored is of the same type as in the unit space, the Mahalanobis distance has a  $\chi^2$  distribution with two degrees of freedom, so the occurrence counts at the 5% and 1% significance levels of this distribution were measured, and the MT method was applied again to these occurrence counts. In this way a signal monitoring system in which the MT method was applied in two stages was constructed. When tested, it demonstrated the possibility of implementing a signal monitoring system that could sensitively detect slight signal changes.

**Key words** : sound diagnosis, analog signal, digitalization, fast Fourier transform, centroid of FFT spectrum, MT method, signal processing, Mahalanobis distance,  $\chi^2$  distribution, threshold, LabVIEW, S/N ratio, Taguchi methods, quality engineering

### 1. はじめに

マイクフォンや加速度ピックアップなど各種センサが検出した物理・化学的事象を電気信号に変換し、それを量子化したデータに対して信号処理した

後、統計的に信号を評価することで信号の異常を検出するシステムは広く普及しており、製造工程での品質管理や設備などの保安・保全診断で活用されている。

信号の異常を検出するための処理としては、生データ自体のパターンマッチングを行う方式や、逆フィルタなどの適合フィルタを通して信号の残渣を統計解析する方法、そして、周波数解析を利用する方

\* 正会員