

國立東華大學應用數學系  
專題演講

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講題：New Control Charting Schemes for Dispersion  
Monitoring of Multivariate Processes

時間：100年5月6日(星期五)15:10-16:40

摘要

For signaling alarms sooner when the dispersion of a multivariate process is “increased” (or “decreased”), new multivariate control charting schemes for Phase II process monitoring are proposed. The proposed charts are constructed based on the two one-sided likelihood ratio tests (LRT) for testing the hypothesis that the covariance matrix of the quality characteristic vector of the current process,  $\Sigma$ , is “larger” (or “smaller”) than that of the in-control process,  $\Sigma_0$ .  $\Sigma$  is “larger” (“smaller”) than  $\Sigma_0$  here means  $\Sigma - \Sigma_0$  ( $\Sigma_0 - \Sigma$ ) is positive semi-definite and  $\Sigma \neq \Sigma_0$ . Assuming  $\Sigma_0$  is known, the LRT statistics are derived and then used to construct the control charts. Furthermore, we also propose a combined charting scheme, which combines these two one-sided charts for detecting either dispersion increases or decreases. Simulation studies show that the proposed one-sided control charting schemes indeed outperform the existing two-sided-test-based control charts under comparison in terms of the average run length. The applicability and effectiveness of the proposed control chart are demonstrated through two real-life examples.



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