Advanced Process Control of Metal Sputter Deposition Using Time Series Analysis

陳俊宏,陳亭祺,郭子瑋
Mechanical Engineering
Engineering
chen@chu.edu.tw

Abstract

Using a time series model, we constructed a disturbance model for the aluminum sputter deposition process, and derived an autoregressive integrated moving average and recursive least-squares (ARIMA-RLS) controller based on this new disturbance model. Experimental results revealed that the ARI(3,1) model appropriately characterized the dynamic behavior of the disturbance for this process. The ARIMA-RLS controller, which includes information on process noise, is able to automatically regulate the model coefficients as the target is replaced or degrades. In this paper, the d-EWMA controller, the age-based d-EWMA controller, and the ARIMA-RLS controller were applied to aluminum sputter deposition processes in order to predict deposition rates and compare their performances. Application of the ARIMA-RLS controller is proven herein to significantly improve the estimation accuracy of the aluminum sputter deposition process, regardless of whether or not deposition rates are measured for each run.

Keyword：Time series model . Deposition rate .
d-EWMA controller