應用物件導向技術及智慧型計算建構半導體製程之最佳化品質控制系統-以化學機械研磨為例

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摘 要

本研究提出一個可用於半導體製程的run-to-run(R2R)多輸入多輸出控制器，此控制器名為智慧型計算品質控制器(Computational Intelligence Quality Controller，CIQC)，其中遞迴估計技術用來估計Hammerstein類型模式的線上參數，而實數型基因演算法(Real-Valued Genetic Algorithm，RVGA)則用來獲得下一次執行的最佳解，基因演算法乃藉著達爾文的進化論所發展而來，其操作過程包括選擇(selection)、複製(reproduction)、交配(crossover)和突變(mutation)。R2R控制器的系統分析與設計使用統一模式語言(Unified Modeling Language，UML)，而CIQC的軟體實作則使用MATLAB，因為它具有許多有用的工具及可建構簡單及友善的使用者操作介面。 在測試方面，以SEMATECH所提供的實際製程設備模式為基礎的化學機械研磨製程來作為模擬的對象，經由實驗結果顯示在不同大小干擾與偏移的存在下，即使輸入-輸出轉換函數為非線性的狀態時，CIQC系統能保持適應性的反應控制，而且可以提供優於OAQC系統的效能。

關鍵詞 : R2R 控制器，統一模式語言，實數型基因演算法，化學機械研磨

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