Delta-Sigma 調變器之錯誤診斷

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摘要

本論文中，我們提出一個新的測試方法，在沒有輸入測試圖樣情況下藉著量測積分器的輸出電壓診斷 delta-sigma 調變器的錯誤。根據推論與電路模擬驗證，此測試方法對於放大器的 offset 與電容比值具有很高的正確度，即使當電路有多個錯誤發生。最後我們提出了 delta-sigma 調變器，應用於數位類比轉換器的 code edge 量測上。它使用 delta-sigma 調變的特性，藉著觀察 PCM 碼的輸出結果就能正確地量測待測數位類比轉換器的輸出直流電壓準位。在 UMC0.18 製程實現此電路的實驗模擬結果，顯示測得數位類比轉換器的 code edge 9bits 的精確度。我們也提出了一個改進的方法，藉著在待測數位類比轉換器的輸出連接放大器，可以有效地增加解析度。

Fault Diagnosis for Delta-Sigma Modulator

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Abstract

In this thesis, we proposed a new test method to diagnose faults in the delta-sigma modulator by measuring output voltage of integrator without input test pattern. The theoretical and simulation results show that this method has a very high accuracy to determine operation amplifier offsets and capacitor ratios even when the circuit has multiple faults. Finally, we present an application of the delta-sigma modulator circuit as a code edge measurement circuit for DAC. It uses delta-sigma modulation property to accurately measure a DC voltage level which could be the output of a DAC-under-test by observing the output of the PCM code. Experimental results on an implemented circuit with UMC0.18 technology show that it can give this measuring circuit a 9-bits resolution for the DAC code edge. We also supply improved method

can be effectively increased the resolution by connecting an amplifier stage at the output of the DAC-under-test.

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