شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

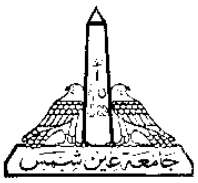
قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY



AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Electronics Engineering and Electrical Communications

Digital Testing of Analogue Circuits

A Thesis submitted in partial fulfilment of the requirements of the degree of

Doctor of Philosophy in Electrical Engineering

(Electronics Engineering and Electrical Communications)

by

Bassam Abdelwahab Aboelftooh

Master of Science in Electrical Engineering

(Electronics Engineering and Electrical Communications)

Faculty of Engineering, MTC, 2012

Supervised By

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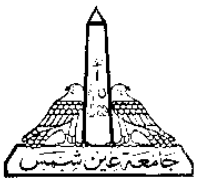
Assoc. Prof. Sameh Aasem Ibrahim

Cairo - (2021)



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Statement

This thesis is submitted as a partial fulfilment of Doctor of Philosophy in Electrical Engineering Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Thesis Summary

This thesis presents the new parametric fault detection (PFD) approach for analog circuits testing. It combines different approaches to enhance the PFD, based on the proper selection of classified frequency-bands with different amplitude weights for fault controllability and the proper selection of test-points for fault observability. The analog test generator (ATG) that stimulates parametric faults in the analog circuit under test (ACUT) generates a test waveform that sweeps on an applicable frequency-band with amplitude weights instead of sweeping the whole frequency-band. The test response is compacted on each applicable frequency-band for digital signature generation. The summation of unwanted samples from other unwanted frequency-bands are avoided for efficient PFD, based on the digital signature curve (DSC) that plots the digital signatures versus each component variation. In addition, the hybrid between the advantage of the MATLAB and the PSPICE simulation is exploited to developed better worst-case analysis (WCA). The presented simulation results, applied to different analog benchmark circuits, show the significant improvement in the PFD compared to other previously published works, in terms of the classified frequency-band and the required number of test-points. In addition, it is found that the best selection of a test waveform is the sweeping-frequency of a sinusoidal waveform with different amplitude weights.

Key words:

Digital testing of analog circuits; testing of analog circuits; classification of frequency-bands; fault detection for parametric faults; selection of test-points.

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July 2021

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