بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

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

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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

A PIPELINE ADC USING ENHANCED-LINEARITY RING-AMPLIFIER

By

Ahmed Gharib Abdelraouf Ahmed Gadelkarim

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Electronics and Communications Engineering

FACULTY OF ENGINEERING ,CAIRO UNIVERSITY
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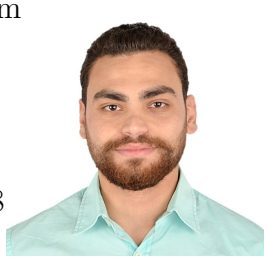

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Title of Thesis:

A Pipeline ADC using Enhanced-Linearity Ring-Amplifier

Key Words:
Ring amplifier, Adaptive slew-rate, Linearity enhancement, ADC, Energy efficient.

Summary:
This thesis proposes a slew rate enhancement technique which solves the fundamental trade-off between speed and stability. The proposal is to use a rail-to-rail controlled feedforward path to be used in parallel with an original ring amplifier. This feedforward path boosts the linearity of the amplifier significantly without any stability degradation. The linearity improvement is achieved by enhancing the slew rate of the used amplifier while minimizing the overhead current consumption. Thus, using this feedforward path enhances the linearity for almost the same current consumption, hence reducing the overall system figure of merit (FoM). The core idea of the thesis has been verified using M-DAC architecture with unity closed loop gain. The proposal enhances the total harmonic distortion by 10dB while reducing the overall FoM by more than half compared to state-of-the-art techniques. Then, a 10-bit 1.5-bit/stage pipeline ADC has been implemented using this adaptive ring-amplifier. The full system has been implemented using TSMC 65nm CMOS technology and 0.9V supply voltage.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Ahmed Gharib Abdelraouf Ahmed Gadelkarim Date:–/–/2020

Signature:

Dedication

I would like to dedicate this work to my parents who are without them I would not be able to do anything.

Acknowledgements

I would like to thank many people who supported and encouraged me to be able to finish this work with high quality. First of all, I would like to specifically thank my advisors Prof. Ahmed Nader, Prof. Mohamed Aboudina, and Prof. Faisal Hussien for their dedicated help and support. They also opened my mind to explore new enhancement techniques till we reached this final form of the thesis. Certainly, I can not forget the role of my great family as they motivated me the whole time to work harder and never to give up against all problems and challenges. My father Prof. Gharib Gadelkarim and Dr. Amany Almahdy did a lot of effort to maintain the suitable environment to be able to work. My brother Mohamed Gharib and his wife May Gaafer were beside me during touch times and give me their opinions to overcome the challenges. Also, I would like to thank my friends, especially, Shrouk Shafie who taught me how to make layout which was an essential step to publish our work. In addition, her continuous support during tough times was very helpful. Another friend I want to thank is Anas Mohamed Wanas who helped me a lot during writing this thesis. Finally, I thank God for all the outputs I have reached and hope that I can even work more on it and one day others will make good use of my work and build on it to make something much better.

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