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Design of Analog Circuits through Symbolic Analysis

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Symbolic Analysis Of Analog Circuits

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Symbolic Analysis Of Analog Circuits:

Symbolic Analysis of Analog Circuits: Techniques and Applications Lawrence P. Huelsman, Georges Gielen, 2012-12-06 This book brings together important contributions and state of the art research results in the rapidly advancing area of symbolic analysis of analog circuits It is also of interest to those working in analog CAD The book is an excellent reference providing insights into some of the most important issues in the symbolic analysis of analog circuits

Design of Analog Circuits Through Symbolic Analysis Mourad Fakhfakh, Esteban Tlelo-Cuautle, Francisco V. Fernández, 2012 Symbolic analyzers have the potential to offer knowledge to sophomores as well as practitioners of analog circuit design Actually they are an essential complement to numerical simulators since they provide insight into circuit behavior which numerical Symbolic Analysis in Analog Integrated Circuit Design Henrik Floberg, 2012-12-06 Symbolic Analysis in Analog Integrated Circuit Design provides an introduction to computer aided circuit analysis and presents systematic methods for solving linear i e small signal and nonlinear circuit problems which are illustrated by concrete examples Computer aided symbolic circuit analysis is useful in analog integrated circuit design Analytic expressions for the network transfer functions contain information that is not provided by a numerical simulation result However these expressions are generally extremely long and difficult to interpret therefore it is necessary to be able to approximate them quided by the magnitude of the individual circuit parameters Engineering has been described as the art of making approximations The inclusion of symbolic analysis in analog circuit design reduces the implied risk of ambiguity during the approximation process A systematic method based on the nullor concept is used to obtain the basic feedback transistor amplifier configurations Approximate expressions for the locations of poles and zeros for linear networks are obtained using the extended pole splitting technique An unusual feature in Symbolic Analysis in Analog Integrated Circuit Design is the consistent use of the transadmittance element with finite linear or nonlinear or infinite i e nullor gain as the only requisite circuit element The describing function method is used to obtain approximate symbolic expressions for the harmonic distortion generated by a soft or hard transconductance nonlinearity embedded in an arbitrary linear network The design and implementation of a program i e CASCA for symbolic analysis of time continuous networks is described The algorithms can also be used to solve other linear problems e g the analysis of time discrete switched capacitor networks Symbolic Analysis in Analog Integrated Circuit Design serves as an excellent resource for students and researchers as well as for industry designers who want to familiarize themselves with circuit analysis This book may also be used for advanced courses on the subject Symbolic Analysis Techniques Francisco Fernández, 1998 Electrical Engineering Symbolic Analysis Techniques Applications to Analog Design Automation Symbolic Analysis Techniques is a collection of original contributions from renowned experts in the field presenting the most recent and important applications of symbolic analysis to analog circuit design This timely self contained volume features an in depth tutorial introduction to the techniques and algorithms

underlying modern symbolic analyzers and includes many references at the end of each chapter Applications are discussed in a variety of important fields Automatic generation of optimum circuit topologies Interactive circuit improvement and automated design space exploration Non fixed topology analog synthesis tools Semiconductor parameter extraction Analog testability and fault diagnosis And many more related areas Symbolic Analysis Techniques also features an extensive comparison of modern symbolic analyzer characteristics and limitations Brimming with practical instructions on tasks like formula simplification and post processing this book will be of use and interest to graduate students researchers and engineers involved in computer aided circuits analysis and analog design automation **Design of Analog Circuits**Through Symbolic Analysis Mourad Fakhfakh, Esteban Tlelo-Cuautle, Francisco V. Fernández, 2012-08-13 Symbolic analyzers have the potential to offer knowledge to sophomores as well as practitioners of analog circuit design Actually they are an essential complement to numerical simulators since they provide insight into circuit behavior which numerical

Symbolic Analysis for Automated Design of Analog Integrated Circuits Georges Gielen, Willy M.C. Sansen, 2012-12-06 It is a great honor to provide a few words of introduction for Dr Georges Gielen's and Prof Willy Sansen's book Symbolic analysis for automated design of analog integrated circuits The symbolic analysis method presented in this book represents a significant step forward in the area of analog circuit design As demonstrated in this book symbolic analysis opens up new possibilities for the development of computer aided design CAD tools that can analyze an analog circuit topology and automatically size the components for a given set of specifications Symbolic analysis even has the potential to improve the training of young analog circuit designers and to guide more experienced designers through second order phenomena such as distortion This book can also serve as an excellent reference for researchers in the analog circuit design area and creators of CAD tools as it provides a comprehensive overview and comparison of various approaches for analog circuit design automation and an extensive bibliography The world is essentially analog in nature hence most electronic systems involve both analog and digital circuitry. As the number of transistors that can be integrated on a single integrated circuit IC substrate steadily increases over time an ever increasing number of systems will be implemented with one or a few very complex ICs because of their lower production costs Symbolic Analysis and Reduction of VLSI Circuits Zhanhai Qin, Chung-Kuan Cheng, 2009-03-13 Symbolic analysis is an intriguing topic in VLSI designs The analysis methods are crucial for the applications to the parasitic reduction and analog circuit evaluation However analyzing circuits symbolically remains a challenging research issue Therefore in this book we survey the recent results as the progress of on going works rather than as the solution of the field For parasitic reduction we approximate a huge amount of electrical parameters into a simplified RLC network This reduction allows us to handle very large integrated circuits with given memory capacity and CPU time A symbolic analysis approach reduces the circuit according to the network topology Thus the designer can maintain the meaning of the original network and perform the analysis hierarchically For analog circuit designs symbolic

analysis provides the relation between the tunable parameters and the characteristics of the circuit The analysis allows us to optimize the circuit behavior The book is divided into three parts Part I touches on the basics of circuit analysis in time domain and in s domain For an s domain expression the Taylor s expansion with s approaching infinity is equivalent to the time domain solution after the inverse Laplace transform On the other hand the Taylor's expansion when s approaches zero derives the moments of the output responses in time domain Part II focuses on the techniques for parasitic reduction In Chapter 2 we present the approximation methods to match the first few moments with reduced circuit orders In Chapter 3 we apply the Y Delta transformation to reduce the dynamic linear network The method finds the exact values of the low order coefficients of the numerator and denominator of the transfer function and thus matches part of the moments In Chapter 4 we handle two major issues of the Y Delta transformation common factors in fractional expressions and round off errors Chapter 5 explains the stability of the reduced expression in particular the Ruth Hurwitz Criterion We make an effort to describe the proof of the Criterion because the details are omitted in most of the contemporary textbooks In Chapter 6 we present techniques to synthesize circuits to approximate the reduced expressions after the transformation In Part III we discuss symbolic generation of the determinants and cofactors for the application to analog designs In Chapter 7 we depict the classical topological analysis approach In Chapter 8 we describe a determinant decision diagram approach that exploits the sparsity of the matrix to accelerate the computation In Chapter 9 we take only significant terms when we search through determinant decision diagram to approximate the solution In Chapter 10 we extend the determinant decision diagram to a hierarchical model The construction of the modules through the hierarchy is similar to the Y Delta transformation in the sense that a byproduct of common factors appears in the numerator and denominator Therefore we describe the method to prune the common factors Special Issue on Symbolic Analysis of Analog Circuits Lawrence P. Huelsman, Georges Gielen, 1993 A Perturbation Approach to the Symbolic Analysis of Analog Circuits Cheng-Shiang Chiang, 1992

Advanced Symbolic Analysis for VLSI Systems Guoyong Shi, Sheldon X.-D. Tan, Esteban Tlelo Cuautle, 2014-06-19 This book provides comprehensive coverage of the recent advances in symbolic analysis techniques for design automation of nanometer VLSI systems The presentation is organized in parts of fundamentals basic implementation methods and applications for VLSI design Topics emphasized include statistical timing and crosstalk analysis statistical and parallel analysis performance bound analysis and behavioral modeling for analog integrated circuits Among the recent advances the Binary Decision Diagram BDD based approaches are studied in depth The BDD based hierarchical symbolic analysis approaches have essentially broken the analog circuit size barrier

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