Digital Sound Synthesis by Physical Modeling Using the Functional Transformation Method

Lutz Trautmann

and

Rudolf Rabenstein

Digital Sound Synthesis By Physical Modeling Using The Functional Transformation Method

Arthur James Wells

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Digital Sound Synthesis by Physical Modeling Using the Functional Transformation Method Lutz Trautmann,Rudolf Rabenstein,2012-09-14 This book considers signal processing and physical modeling meth ods for sound synthesis Such methods are useful for example in mu sic synthesizers computer sound cards and computer games Physical modeling synthesis has been commercialized for the first time about 10 years ago Recently it has been one of the most active research topics in musical acoustics and computer music The authors of this book Dr Lutz Trautmann and Dr Rudolf Rabenstein are active researchers and inventors in the field of sound synthesis Together they have developed a new synthesis technique called the functional transformation method which can be used for pro ducing musical sound in real time Before this book they have published over 20 papers on the topic in journals and conference proceedings In this excellent textbook the results are combined in a single volume I believe that this will be considered an important step forward for the whole community **Digital Sound Synthesis by Physical Modeling Using the Functional Transformation Method** Lutz Trautmann,Rudolf Rabenstein,2012-12-06 This book considers signal processing and physical modeling meth ods for sound synthesis Such methods are useful for example in mu sic synthesizers computer sound cards and computer games Physical modeling synthesis has been commercialized for the first time about 10 years ago Recently it has been one of the most active research topics in musical acoustics and computer music The authors of this book Dr Lutz Trautmann and Dr Rudolf Rabenstein are active researchers and inventors in the field of sound synthesis Together they have developed a new synthesis technique called the functional transformation method which can be used for pro ducing musical sound in real time Before this book they have published over 20 papers on the topic in journals and conference proceedings In this excellent textbook the results are combined in a single volume I believe that this will be considered an important step forward for the whole community **Digital Sound Synthesis by Physical Modeling of Musical Instruments Using Functional Transformation Models** Friedrich-Alexander-Universität Erlangen-Nürnberg. Technische Fakultät,2002 Numerical Sound Synthesis Stefan Bilbao,2009-09-03 Digital sound synthesis has long been approached using standard digital filtering techniques Newer synthesis strategies however make use of physical descriptions of musical instruments and allow for much more realistic and complex sound production and thereby synthesis becomes a problem of simulation This book has a special focus on time domain finite difference methods presented within an audio framework It covers time series and difference operators and basic tools for the construction and analysis of finite difference schemes including frequency domain and energy based methods with special attention paid to problems inherent to sound synthesis Various basic lumped systems and excitation mechanisms are covered followed by a look at the 1D wave equation linear bar and string vibration acoustic tube modelling and linear membrane and plate vibration Various advanced topics such as the nonlinear vibration of strings and plates are given an elaborate treatment Key features Includes a historical overview of digital sound synthesis techniques

highlighting the links between the various physical modelling methodologies A pedagogical presentation containing over 150 problems and programming exercises and numerous figures and diagrams and code fragments in the MATLAB programming language helps the reader with limited experience of numerical methods reach an understanding of this subject Offers a complete treatment of all of the major families of musical instruments including certain audio effects Numerical Sound Synthesis is suitable for audio and software engineers and researchers in digital audio sound synthesis and more general musical acoustics Graduate students in electrical engineering mechanical engineering or computer science working on the more technical side of digital audio and sound synthesis will also find this book of interest The Computer Music Tutorial, second edition Curtis Roads,2023-06-06 Expanded updated and fully revised the definitive introduction to electronic music is ready for new generations of students Essential and state of the art The Computer Music Tutorial second edition is a singular text that introduces computer and electronic music explains its motivations and puts topics into context Curtis Roads s step by step presentation orients musicians engineers scientists and anyone else new to computer and electronic music The new edition continues to be the definitive tutorial on all aspects of computer music including digital audio signal processing musical input devices performance software editing systems algorithmic composition MIDI and psychoacoustics but the second edition also reflects the enormous growth of the field since the book s original publication in 1996 New chapters cover up to date topics like virtual analog pulsar synthesis concatenative synthesis spectrum analysis by atomic decomposition Open Sound Control spectrum editors and instrument and patch editors Exhaustively referenced and cross referenced the second edition adds hundreds of new figures and references to the original charts diagrams screen images and photographs in order to explain basic concepts and terms Features New chapters virtual analog pulsar synthesis concatenative synthesis spectrum analysis by atomic decomposition Open Sound Control spectrum editors instrument and patch editors and an appendix on machine learning Two thousand references support the book s descriptions and point readers to further study Mathematical notation and program code examples used only when necessary Twenty five years of classroom seminar and workshop use inform the pace and level of the material *The Oxford Handbook of Interactive Audio* Karen Collins,Bill Kapralos,Holly Tessler,2014 What does it mean to interact with sound How does interactivity alter our experience as creators and listeners What does the future hold for interactive musical and sonic experiences This book answers these questions with newly commissioned chapters that explore the full range of interactive audio in games performance design and practice **Journal of the Audio Engineering Society** Audio Engineering Society,2005 Directory of members published as pt 2 of Apr 1954 issue *Acoustics of Musical Instruments* Antoine Chaigne,Jean Kergomard,2016-05-12 This book the first English language translation of Acoustique des instruments de musique Second Edition presents the necessary foundations for understanding the complex physical phenomena involved in musical instruments What is the function of the labium in a flute Which features of an instrument allow us to make a clear audible

distinction between a clarinet and a trumpet With the help of numerous examples these questions are addressed in detail The authors focus in particular on the significant results obtained in the field during the last fifteen years Their goal is to show that elementary physical models can be used with benefit for various applications in sound synthesis instrument making and sound recording The book is primarily addressed to graduate students and researchers however it could also be of interest for engineers musicians craftsmen and music lovers who wish to learn about the basics of musical acoustics Sound to Sense, Sense to Sound Pietro Polotti,2008 Since the 1950s Sound and Music Computing SMC research has had a profound impact on the development of culture and technology in our post industrial society SMC research approaches the whole sound and music communication chain from a multidisciplinary point of view By combining scientific technological and artistic methodologies it aims at understanding modeling representing and producing sound and music using computational approaches This book by describing the state of the art in SMC research gives hints of future developments whose general purpose will be to bridge the semantic gap the hiatus that currently separates sound from sense and sense from sound

Multidimensional Signals and Systems Rudolf Rabenstein,Maximilian Schäfer,2023-07-24 This book covers the theory of multidimensional signals and systems and related practical aspects It extends the properties and mathematical tools of one dimensional signals and systems to multiple dimensions and covers relevant timeless topics including multidimensional transformations multidimensional sampling as well as discrete multidimensional systems A special emphasis is placed on physical systems described by partial differential equations the construction of suitable integral transformations and the implementation of the corresponding discrete time algorithms To this end signal spaces and functional transformations are introduced at a mathematical level provided by undergraduate programs in engineering and science The presentation takes a comprehensive illustrative and educational approach without reference to a particular application field Instead the book builds a solid theoretical concept of multidimensional signals and systems and shows the application to various problems relevant for practical scenarios *Signals, Systems and Sound Synthesis* Martin Neukom,2013 How to use this book Fundamentals of acoustics Signals and systems Computer programs and programming languages Fundamentals of sound synthesis Nonlinear techniques Other techniques for sound analysis and synthesis Physical modeling Sound and space Computers and composition **IEEE ASSP Workshop on Applications of Signal Processing to Audio and Acoustics** ,2003 **The Journal of the Acoustical Society of America** Acoustical Society of America,2006 **IEEE ... Workshop on Multimedia Signal Processing** ,2004 *Mathematical Reviews* ,2005 *Proceedings of the ... International Computer Music Conference* ,2005 *American Book Publishing Record* ,2003 **1999 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics** IEEE Signal Processing Society,1999 This workshop provided an informal environment for the discussion of problems in audio and acoustics and the signal processing techniques applied to these problems Topics addressed include audio content analysis sound editing restoration and enhancement and virtual acoustics

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