

<<连续与离散时间信号与系统>>

图书基本信息

书名：<<连续与离散时间信号与系统>>

13位ISBN编号：9787115223944

10位ISBN编号：7115223947

出版时间：201004

出版时间：人民邮电出版社

作者：Mrinal Mandal, Amir Asif

页数：865

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

## 前言

The book is primarily intended for instruction in an upper-level undergraduate or a first-year graduate course in the field of signal processing in electrical and computer engineering. Practising engineers would find the book useful for reference or for self study. Our main motivation in writing the book is to deal with continuous-time (CT) and discrete-time (DT) signals and systems separately. Many instructors have realized that covering CT and DT systems in parallel with each other often confuses students to the extent where they are not clear if a particular concept applies to a CT system, to a DT system, or to both. In this book, we treat DT and CT signals and systems separately. Following Part I, which provides an introduction to signals and systems, Part II focuses on CT signals and systems. Since many students are familiar with the theory of CT signals and systems from earlier courses, Part II can be taught to such students with relative ease. For students who are new to this area, we have supplemented the material covered in Part II with appendices which are included at the end of the book. Appendices A-F cover background material on complex numbers, partial fraction expansion, differential equations, difference equations, and a review of the basic signal processing instructions available in MATLAB. Part III, which covers DT signals and systems, can either be covered independently or in conjunction with Part II. The book focuses on linear time-invariant (LTI) systems and is organized as follows. Chapters 1 and 2 introduce signals and systems, including their mathematical and graphical interpretations. In Chapter 1, we cover the classification between CT and DT signals and we provide several practical examples in which CT and DT signals are observed. Chapter 2 defines systems as transformations that process the input signals and produce outputs in response to the applied inputs. Practical examples of CT and DT systems are included in Chapter 2. The remaining fifteen chapters of the book are divided into two parts. Part II constitutes Chapters 3-8 of the book and focuses primarily on the theories and applications of CT signals and systems. Part III comprises Chapters 9—17 and deals with the theories and applications of DT signals and systems. The organization of Parts II and III is described below.

## <<连续与离散时间信号与系统>>

### 内容概要

本书涵盖了连续与离散时间信号与系统的方方面面。

全书内容分为三大部分，分别为信号与系统概述、连续时间信号与系统，以及离散时间信号与系统。书中还有大量的例题和习题，供学生巩固所学内容。

本书既可作为高等院校电子电气等相关专业学生的参考教材，又可供电子电气工程师参考。

## <<连续与离散时间信号与系统>>

### 作者简介

Mrinal Mandal加拿大阿尔伯塔大学电气与计算机工程系副教授。

主要研究兴趣包括多媒体信号处理、医用图像与视频分析、图像与视频压缩，以及用于实时信号与图像处理的VLSI架构。

<<连续与离散时间信号与系统>>

书籍目录

Part I Introduction to signals and systems 1 Introduction to signals 1.1 Classification of signals 1.2 Elementary signals 1.3 Signal operations 1.4 Signal implementation with MATLAB 1.5 Summary Problems 2 Introduction to systems 2.1 Examples of systems 2.2 Classification of systems 2.3 Interconnection of systems 2.4 Summary Problems Part II Continuous-time signals and systems 3 Time-domain analysis of LTIC systems 3.1 Representation of LTIC systems 3.2 Representation of signals using Dirac delta functions 3.3 Impulse response of a system 3.4 Convolution integral 3.5 Graphical method for evaluating the convolution integral 3.6 Properties of the convolution integral 3.7 Impulse response of LTIC systems 3.8 Experiments with MATLAB 3.9 Summary Problems 4 Signal representation using Fourier series 4.1 Orthogonal vector space 4.2 Orthogonal signal space 4.3 Fourier basis functions 4.4 Trigonometric CTFS 4.5 Exponential Fourier series 4.6 Properties of exponential CTFS 4.7 Existence of Fourier series 4.8 Application of Fourier series 4.9 Summary Problems 5 Continuous-time Fourier transform 5.1 CTFT for aperiodic signals 5.2 Examples of CTFT 5.3 Inverse Fourier transform 5.4 Fourier transform of real, even, and odd functions 5.5 Properties of the CTFT 5.6 Existence of the CTFT 5.7 CTFT of periodic functions 5.8 CTFS coefficients as samples of CTFT 5.9 LTIC systems analysis using CTFT 5.10 MATLAB exercises 5.11 Summary Problems 6 Laplace transform 6.1 Analytical development 6.2 Unilateral Laplace transform 6.3 Inverse Laplace transform 6.4 Properties of the Laplace transform 6.5 Solution of differential equations 6.6 Characteristic equation, zeros, and poles 6.7 Properties of the ROC 6.8 Stable and causal LTIC systems 6.9 LTIC systems analysis using Laplace transform 6.10 Block diagram representations 6.11 Summary Problems 7 Continuous-time filters 7.1 Filter classification 7.2 Non-ideal filter characteristics 7.3 Design of CT lowpass filters 7.4 Frequency transformations 7.5 Summary Problems 8 Case studies for CT systems 8.1 Amplitude modulation of baseband signals 8.2 Mechanical spring damper system 8.3 Armature-controlled dc motor 8.4 Immune system in humans 8.5 Summary Problems Part III Discrete-time signals and systems 9 Sampling and quantization 9.1 Ideal impulse-train sampling 9.2 Practical approaches to sampling 9.3 Quantization 9.4 Compact disks 9.5 Summary Problems 10 Time-domain analysis of discrete-time systems systems 10.1 Finite-difference equation representation of LTID systems 10.2 Representation of sequences using Dirac delta functions 10.3 Impulse response of a system 10.4 Convolution sum 10.5 Graphical method for evaluating the convolution sum 10.6 Periodic convolution 10.7 Properties of the convolution sum 10.8 Impulse response of LTID systems 10.9 Experiments with MATLAB 10.10 Summary Problems 11 Discrete-time Fourier series and transform 11.1 Discrete-time Fourier series 11.2 Fourier transform for aperiodic functions 11.3 Existence of the DTFT 11.4 DTFT of periodic functions 11.5 Properties of the DTFT and the DTFS 11.6 Frequency response of LTID systems 11.7 Magnitude and phase spectra 11.8 Continuous-and discrete-time Fourier transforms 11.9 Summary Problems 12 Discrete Fourier transform 12.1 Continuous to discrete Fourier transform 12.2 Discrete Fourier transform 12.3 Spectrum analysis using the DFT 12.4 Properties of the DFT 12.5 Convolution using the DFT 12.6 Fast Fourier transform 12.7 Summary Problems 13 The z-transform 13.1 Analytical development 13.2 Unilateral z-transform 13.3 Inverse z-transform 13.4 Properties of the z-transform 13.5 Solution of difference equations 13.6 z-transfer function of LTID systems 13.7 Relationship between Laplace and z-transforms 13.8 Stability analysis in the z-domain 13.9 Frequency-response calculation in the z-domain 13.10 DTFT and the z-transform 13.11 Experiments with MATLAB 13.12 Summary Problems 14 Digital filters 14.1 Filter classification 14.2 FIR and IIR filters 14.3 Phase of a digital filter 14.4 Ideal versus non-ideal filters 14.5 Filter realization 14.6 FIR filters 14.7 IIR filters 14.8 Finite precision effect 14.9 MATLAB examples 14.10

<<连续与离散时间信号与系统>>

Summary Problems 15 FIR filter design 15.1 Lowpass filter design using windowing method 15.2  
 Design of highpass filters using windowing 15.3 Design of bandpass filters using windowing 15.4  
 Design of a bandstop filter using windowing 15.5 Optimal FIR filters 15.6 MATLAB examples 15.7  
 Summary Problems 16 IIR filter design 16.1 IIR filter design principles 16.2 Impulse invariance  
 16.3 Bilinear transformation 16.4 Designing highpass, bandpass, and bandstop IIR filters 16.5 IIR and FIR  
 filters 16.6 Summary Problems 17 Applications of digital signal processing 17.1 Spectral estimation  
 17.2 Digital audio 17.3 Audio filtering 17.4 Digital audio compression 17.5 Digital images  
 17.6 Image filtering 17.7 Image compression 17.8 Summary Problems Appendix A  
 Mathematical preliminaries A.1 Trigonometric identities A.2 Power series A.3 Series summation  
 A.4 Limits and differential calculus A.5 Indefinite integrals Appendix B Introduction to the  
 complex-number system B.1 Real-number system B.2 Complex-number system B.3 Graphical  
 interpretation of complex numbers B.4 Polar representation of complex numbers B.5 Summary  
 Problems Appendix C Linear constant-coefficient differential equations C.1 Zero-input response C.2  
 Zero-state response C.3 Complete response Appendix D Partial fraction expansion D.1 Laplace  
 transform D.2 Continuous-time Fourier transform D.3 Discrete-time Fourier transform D.4  
 The z-transform Appendix E Introduction to MATLAB E.1 Introduction E.2 Entering data into  
 MATLAB E.3 Control statements E.4 Elementary matrix operations E.5 Plotting functions  
 E.6 Creating MATLAB functions E.7 Summary Appendix F About the CD F.1 Interactive  
 environment F.2 Data F.3 MATLAB codes Bibliography Index

## &lt;&lt;连续与离散时间信号与系统&gt;&gt;

## 章节摘录

Signals are detectable quantities used to convey information about time-varying physical phenomena. Common examples of signals are human speech, temperature, pressure, and stock prices. Electrical signals, normally expressed in the form of voltage or current waveforms, are some of the easiest signals to generate and process. Mathematically, signals are modeled as functions of one or more independent variables. Examples of independent variables used to represent signals are time, frequency, or spatial coordinates. Before introducing the mathematical notation used to represent signals, let us consider a few physical systems associated with the generation of signals. Figure 1.1 illustrates some common signals and systems encountered in different fields of engineering, with the physical systems represented in the left-hand column and the associated signals included in the right-hand column. Figure 1.1 (a) is a simple electrical circuit consisting of three passive components: a capacitor  $C$ , an inductor  $L$ , and a resistor  $R$ . A voltage  $v(t)$  is applied at the input of the RLC circuit, which produces an output voltage  $v_C(t)$  across the capacitor. A possible waveform for  $v(t)$  is the sinusoidal signal shown in Fig. 1.1 (b). The notations  $v(t)$  and  $v_C(t)$  include both the dependent variable,  $v$  and  $v_C$ , respectively, in the two expressions, and the independent variable  $t$ . The notation  $v(t)$  implies that the voltage is a function of time  $t$ . Figure 1.1 (c) shows an audio recording system where the input signal is an audio or a speech waveform. The function of the audio recording system is to convert the audio signal into an electrical waveform, which is recorded on a magnetic tape or a compact disc. A possible resulting waveform for the recorded electrical signal is shown in Fig. 1.1 (d). Figure 1.1 (e) shows a charge coupled device (CCD) based digital camera where the input signal is the light emitted from a scene. The incident light charges a CCD panel located inside the camera, thereby storing the external scene in terms of the spatial variations of the charges on the CCD panel. Figure 1.1 (g) illustrates a thermometer that measures the ambient temperature of its environment. Electronic thermometers typically use a thermal resistor, known as a thermistor, whose resistance varies with temperature. The fluctuations in the resistance are used to measure the temperature. Figure.

<<连续与离散时间信号与系统>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>