

Digital Signal Processing

Using MATLAB, Third Edition

Robert J. Schilling and Sandra L. Harris

Cengage Learning, 2017

Description

The focus of this book is the development, implementation, and application of modern DSP techniques. This text is written in an engaging informal style that provides motivation for each new topic, and features a careful transition between topics. The text is divided into three major parts: Signal and System Analysis, Digital Filter Design, and Advanced Signal Processing. Each chapter starts with a motivation section that includes practical examples that can be solved using techniques covered in the chapter. Examples often feature the processing of speech or sound to directly illustrate the effects of different DSP techniques. Each chapter concludes with a detailed case study example, a chapter summary with student learning outcomes, and a generous selection of homework problems cross referenced to sections within the chapter. This book features comprehensive course software called the DSP Companion that is designed to be used both inside the classroom by the instructor and outside the classroom by the student. The DSP companion driver program runs under Windows with MATLAB and provides a menu of options including: Settings, chapter GUI modules, Examples, Figures, Tables, Definitions, Mark Problems (student), Power Point lectures (instructor), Solutions (instructor), Documentation, and Web. The chapter GUI modules allow students to compare and interactively explore the analysis and design topics covered in each chapter, all without any need for programming. The GUI modules feature a common user interface that is simple to use and easy to learn. Communication of results between GUI modules is facilitated by Export and Import options.

Instructor Features

1. This text is written in an engaging informal style that provides motivation for each new topic, and features a careful transition between topics.
2. It is assumed that the students have basic familiarity with the Laplace and Fourier transforms.
3. The text is divided into three major parts: Signal and System Analysis, Digital Filter Design, and Advanced Signal Processing.

4. The text includes enough material, and flexibility in the way it can be covered, to accommodate courses of different lengths.
5. Significant terms are set apart for convenient reference using margin notes.
6. Explicit definitions, propositions, and algorithms highlight the significance of important terms, results, and procedures.
7. Numerous examples are used throughout to illustrate the analysis and design techniques.
8. Each chapter starts with a Motivation section that includes practical examples that can be solved using techniques covered in the chapter.
9. Sections marked with a * denote more advanced or more specialized material that can be skipped without loss of continuity.
10. Examples often feature the processing of speech or sound to directly illustrate the effects of different DSP techniques.
11. Each chapter includes a detailed case study example that uses the techniques introduced in the chapter.
12. Each chapter has a chapter summary section with a table of student learning outcomes.
13. Each chapter ends with a generous selection of homework problems. There are three types of problems, and problems are cross referenced to sections within the chapter.
14. Detailed tables of transform pairs and properties are provided for reference in an appendix.
15. Useful mathematical identities are listed for reference in an appendix.
16. Design of noncausal zero-phase FIR filters is presented.
17. Interactive example with video aliasing is included.
18. Techniques for both adaptive and fixed system identification and equalization are included.
19. A section on active control of acoustic noise is included.
20. Comprehensive course software called the DSP Companion is available with separate Student and Instructor versions tested on the latest versions of Windows and MATLAB.
21. DSP Companion is designed to be used both inside the classroom by the instructor and outside the classroom by the student.
22. The DSP companion driver program contains the follow menu options:
 - (a) Settings option to control operating modes and default folders
 - (b) GUI Modules option for interactive design and exploration of chapter topics

- (c) Examples option for running and viewing all MATLAB examples
 - (d) Figures option for displaying all examples
 - (e) Tables option for display all tables
 - (f) Definitions option for displaying all definitions, propositions, and algorithms
 - (g) Marked Problems option for displaying solutions to selected problems (student)
 - (h) Presentations option for displaying Power point lectures (instructor)
 - (i) Solutions option for displaying solutions to all homework problems (instructor)
 - (j) Documentation option for displaying user help for all DSP Companion functions
 - (k) Web option for downloading the most recent version of DSP Companion
23. Each problem solution is on a separate pdf file that includes a statement of the problem followed by a complete solution.
 24. Chapter GUI modules allow students to quickly compare and interactively explore the analysis and design topics covered in each chapter, all without any need for programming.
 25. The chapter GUI modules feature a common user interface that is simple to use and easy to learn.
 26. Communication of results between GUI modules is facilitated by Export and Import options.
 27. An extensive library of DSP Companion functions is provided for writing user programs.
 28. DSP Companion does not require any specialized MATLAB toolboxes.