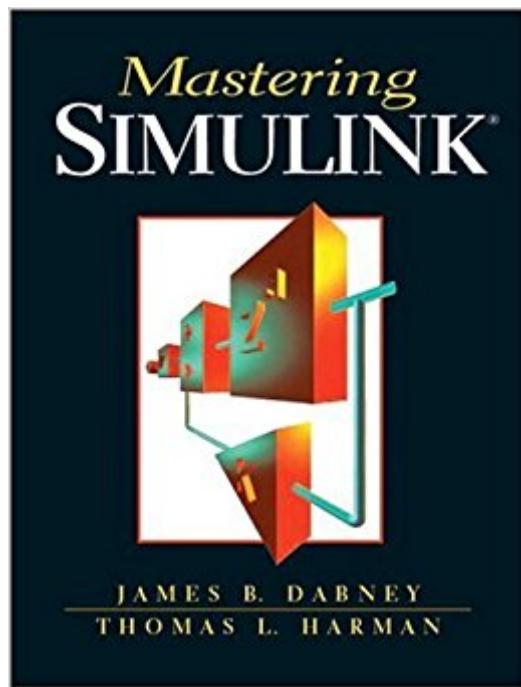


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# Mastering Simulink



## Synopsis

Simulink is a programming language specifically designed for simulating dynamical systems using standard block diagram notation. Designed for readers with the appropriate mathematical preparation that includes a good understanding of the fundamental concepts from introductory experience such as calculus and differential equations, this book presents detailed coverage of programming using Simulink. Beginning with a block diagram tutorial, the book presents an overview of Simulink and describes in detail the procedures for building, editing, and running a Simulink model. The book also provides explanations for debugging techniques, including the interactive debugger; contains an examination of Stateflow, a Simulink extension that adds the capability to model finite state machines subsystems using a variant of the popular Statecharts formalism; and concludes with an introduction to Real-Time Workshop. For professionals with a career in engineering, control systems, programming, or science.

## Book Information

Paperback: 400 pages

Publisher: Pearson (November 7, 2003)

Language: English

ISBN-10: 0131424777

ISBN-13: 978-0131424777

Product Dimensions: 6.9 x 1 x 9 inches

Shipping Weight: 1.4 pounds (View shipping rates and policies)

Average Customer Review: 3.8 out of 5 stars 9 customer reviews

Best Sellers Rank: #773,030 in Books (See Top 100 in Books) #95 in Books > Science & Math > Physics > Chaos Theory #1060 in Books > Computers & Technology > Computer Science > AI & Machine Learning #3778 in Books > Engineering & Transportation > Engineering > Electrical & Electronics

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We intend for this book to serve as a tutorial for new users of Simulink and as a reference for experienced users. The book covers all of the important capabilities of Simulink, including subsystems, masking, callbacks, S-Functions, and debugging. The book is meant to be used with Simulink 5 and subsequent revisions. The examples were produced with Simulink Version 5.0. Simulink is a programming language specifically designed for simulating dynamical systems. Therefore, in order for you to use Simulink effectively, you should have the appropriate mathematical preparation. We assume you have a good understanding of the concepts usually covered in the introductory courses in calculus and differential equations. However, as many new users of Simulink may be unfamiliar with block diagram notation, we included a chapter that introduces the notation.

**USING THE BOOK** Here, we offer suggested reading sequences for new users of Simulink, for users experienced with a previous version of Simulink, and for advanced users ready to take advantage of all of the power of Simulink.

**New Users** It is possible to model fairly complex systems with basic proficiency with Simulink. The fastest way to gain this basic proficiency is to adhere to the following sequence: If you are new to block diagrams, read Sections 2.1 and 2.2. These sections introduce block diagram notation and illustrate using block diagrams to model scalar continuous systems. Carefully work through all of the examples in Chapters 3 and 4 to master the mechanics of building and running models. Read Sections 5.1, 5.2, and 5.4 and experiment with the examples. After completing this material, you should be comfortable building and running models of scalar continuous systems. As you gain proficiency with Simulink, complete Chapter 2, then work through the rest of Chapter 5 and Chapter 6. If you have access to Stateflow, work through Chapter 14. If you have access to Real-Time Workshop, work through Sections 15.1 through 15.3 and read Section 15.4. If you have access to xPC, also work through Section 15.4.

**Experienced Users** If you are experienced with a previous version of Simulink, or, if you are a new user, after you have acquired basic proficiency, we suggest you proceed as follows: Read Section 3.4. The new help system provides detailed online documentation for all Simulink blocks. We believe that you will find the help system to be easy to use and to be a real time saver. Review Chapter 4. The Simulink user interface has many improvements over the previous version of

Simulink. Pay particular attention to Section 4.8 concerning selecting and configuring a solver. Scan Chapters 5 and 6. Pay particular attention to Section 5.2.1. Read Sections 7.1 and 7.2, then work through Sections 7.3 and 7.4 in detail. Learning to use conditionally executed subsystems will allow you to build efficient models. Read Chapter 8, even if you don't plan to use the analysis capabilities right away. You may well discover that the analysis tools will make your use of Simulink much more productive. Read Chapter 12 carefully. The new debugging features can save lots of time. Review Chapter 13. An understanding of the numerical issues can allow you to build models that are faster and more accurate. Advanced Users If you are already experienced with Simulink 5, we suggest you proceed as follows: Scan Chapter 4 to review the basics of model building, and scan Chapter 13 to review the numerical issues. Read Chapters 7 and 8 to review subsystems, masking, and Simulink analysis tools. If you intend to build graphical user interfaces or interactive animations, read Chapter 9 and study the examples. Review Chapter 10, particularly Sections 10.1 through 10.4. Even if you don't need to use S-Functions right away, understanding the capability will allow you to recognize situations in which S-Functions are appropriate. Review Chapter 11 and experiment a little with the Animation Toolbox and Dials and Gauges, if available.

I bought this to help me learn Simulink and while it did help, it doesn't very little in helping you get started learning. This book goes into detail about each block and gives you the "life story" of said block. It doesn't really touch on how to connect multiple blocks together into a working simulation and it barely touches upon items such as the model workspace, the block library interface, it doesn't touch on how to tie Matlab scripts into a model, etc. If you are just starting with Simulink, this is not the book for you. If you already semi-know how to use Simulink and you want a more detailed knowledge about each block, then this might be of some help.

This is the best Simulink text book that I have found for those interested in learning it or just to keep as a reference.

Bought this to help me boot my Simulink 'kung fu'. This really did help me get up and going quickly.

What was needed for the class and covered much of the material needed for the job a my facility and position.

Not the best ever. Does not flow smoothly. I ended up returning it. Kind of a bummer. I think there

are some better books out there.

I have been using Simulink ever since it's born in early 90's. I got this book because I have "Mastering Simulink 2" from the same authors. Few years ago, Simulink official manual is poorly written in the sense that a lot of important information were left out. "Master Simulink 2" was useful then. Starting Matlab 6, MathWorks has put in a big effort to roll out its official manuals, especially on Simulink 4. Therefore, this new book has little value (no more information) on top of the existing manuals. This book has a few nontrivial c-mex file examples that are pretty much the only useful pages I can get some benefits from. The official manual "Writing S-Function" covers a lot more detailed materials to show user how to write c-mex, Fortran-mex, Ada-mex files with Simulink, which is the essence of building any real world design application. The book did not talk about Simulink Performance Tools, which is a very useful side product to work with Simulink. Overall, for any beginner who can not access the official MATLAB 6/Simulink 4 manuals, this book is a good choice to solve some simple "textbook" problems. But I doubt anyone can learn much from this book to accomplish serious, practical, and real-world design applications.

"We intend for this book to serve both as a tutorial for new users of Simulink and as a reference for experienced users. The book COVERS ALL OF THE IMPORTANT CAPABILITIES OF SIMULINK, including subsystems, masking, callbacks, S-Functions, and debugging...."[from the book of the preface]

The content is basic, and is based in SIMULINK 4.0 but is good for a quick reference, very good to new Simulink users

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