Mastering Simulink

By James B. Dabney, Thomas L. Harman

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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.

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Editorial Review

From the Back Cover
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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:

1. 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.
2. Carefully work through all of the examples in Chapters 3 and 4 to master the mechanics of building and running models.
3. 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.
4. As you gain proficiency with Simulink, complete Chapter 2, then work through the rest of Chapter 5 and Chapter 6.
5. If you have access to Stateflow, work through Chapter 14.
6. 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:

1. 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.
2. 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.
3. Scan Chapters 5 and 6. Pay particular attention to Section 5.2.1.
4. 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.
5. 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.
6. Read Chapter 12 carefully. The new debugging features can save lots of time.
7. 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:

1. Scan Chapter 4 to review the basics of model building, and scan Chapter 13 to review the numerical issues.
2. Read Chapters 7 and 8 to review subsystems, masking, and Simulink analysis tools.
3. If you intend to build graphical user interfaces or interactive animations, read Chapter 9 and study the examples.
4. 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.
5. Review Chapter 11 and experiment a little with the Animation Toolbox and Dials and Gauges, if available.

Users Review

From reader reviews:

Fern Marshall:

Spent a free the perfect time to be fun activity to complete! A lot of people spent their leisure time with their family, or their friends. Usually they carrying out activity like watching television, planning to beach, or picnic inside park. They actually doing ditto every week. Do you feel it? Will you something different to fill your own free time/ holiday? Might be reading a book may be option to fill your totally free time/ holiday. The first thing that you will ask may be what kinds of guide that you should read. If you want to attempt look for book, may be the guide untitled Mastering Simulink can be very good book to read. May be it can be best activity to you.

Elizabeth Schwartz:

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