

A Perspective on M&S Textbooks and Literature

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There are a number of textbooks on modeling and simulation (M&S): some of which are designed to support a single introductory course at the undergraduate level, and others deal with a particular aspect of simulation (such as random number generation or stochastic aspects). Table 1 identifies some of these (with those more than a decade old simply grouped into an *older* category); some of the more popular (widely used) general texts are listed in bold.

There are a multitude of M&S related conferences (or portions of conferences), not only sponsored by simulation-focused professional societies (such as the Society of Modeling and Simulation, International, previous the Society for Computer Simulation) but also sponsored by larger discipline societies (such as the AIAA or IEEE). Proceedings from these conferences and M&S-related journals/publications contain thousands of papers and articles each year. A few of these employ standard peer-review/refereed processes for the materials which they publish; most do not.

My impression is that:

- a) Many involved in M&S development, modification/maintenance, management, and/or use have limited awareness of much of the material in this literature, and there is not currently a convenient way to plumb its riches (efforts like the 1998 *Handbook of Simulation* to provide such have not penetrated the consciousness of the general M&S world or are not perceived as being what is needed in that regard).
- b) In the absence of formal best practices (guides, standards, etc.) from the simulation-focused professional societies, such guidance is being developed as adjuncts to M&S application domains (such as the 1998 AIAA V&V Guide for CFD Simulations). While such can be very helpful, such guidance usually does not address aspects of M&S fundamentals, and the different communities may introduce approaches that will conflict with one another and create unnecessary problems when M&S applications cross community boundaries.
- c) Appropriate best practices are functions of M&S application (size, focus, domain, etc.). Our failure to provide clear guidance in such contributes to some of the inappropriate ways that M&S are developed, managed, and used.

This material is provided for consideration and use by the Sim Science Workshop participants as requested.

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Table 1
Modeling and Simulation Books

Four Categories

General
Simulation Aspect/Application Area Specific
Simulation Language Oriented
Older Items (all categories a decade or more old)

Bold entry for the few believed to be widely used in academic courses

Acknowledgment

Many of the items listed below may be found in M&S resource lists of Dr. Hossein Arsham of the University of Baltimore

Not only are many books not included in this table, but web-based book equivalents are not included (such as the information on discrete event simulation modeling available from Dr. Arsham's website:
<http://ubmail.ubalt.edu/~harsham/simulation/sim.htm>).

General Books

Banks, J., (Ed.), *Handbook of Simulation*, John Wiley, 1998.

Bossel, H., *Modeling & Simulation*, A. K. Peters Pub., 1994.

Bennett, B., *Simulation Fundamentals*, Prentice Hall, 1995.

Casti, John L., *Would-Be Worlds: How Simulation is Changing the Frontiers of Science*, John Wiley & Sons, 1998.

Cloud, D.J. and L.B. Rainey, *Applied Modeling and Simulation: An Integrated Approach to Development and Operation*, McGraw-Hill, 1998.

Dorner, Dietrick, *The Logic of Failure*, Perseus Publishing, 1996.

Fishwick, P., *Simulation Model Design and Execution: Building Digital Worlds*, Prentice-Hall, Englewood Cliffs, 1995.

Gardner, F., and J. Baker, *Simulation Techniques*, Two Volumes, Wiley, London, 1996.

Gould, H., *Introduction to Computer Simulation Methods*, Addison Wesley Pub. Co., 1995.

Hamilton, J., D. Nash, and U. Pooch, (eds.), *Distributed Simulation*, CRC Press, 1997.

Harrell, Ch., and K. Tumay, *Simulation Made Easy: A Manager's Guide*, Inst. of Industrial Engineers, 1996.

Harrington, J., and K. Tumay, *Simulation Modeling Methods: An Interactive Guide to Results-Based Decision*, McGraw-Hill, 1998.

Kuipers, B., *Qualitative Reasoning: Modeling and Simulation with Incomplete Knowledge*, MIT Press, 1994.

Law, A., and W. Kelton, *Simulation Modeling and Analysis* (3rd edition), McGraw-Hill, New York, 2000.

Morgan, Mary S. (Editor) and Morrison, Margaret (Editor), *Models as Mediators: Perspectives on Natural and Social Science*, Cambridge Univ. Pr., 2000

Ross, Sh., *Simulation*, Academic Press, 1997.

Rubinstein, R., and B. Melamed, *Modern Simulation and Modeling*, Wiley, 1998.

Zobrist, G. and Leonard J. (eds), *Progress in Simulation, Volumes I and II*, Ablex Publishing, Norwood, NJ., 1995.

Zeigler, B., H. Praehofer, and T-G. Kim, *Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems*, Academic Press, 2000.

Simulation Aspect or Application Area Specific

Balemi, S., P. Kozak, and R. Smedinga, (eds.), *Discrete Event Systems: Modeling and Control*, Birkhauser, Basel, 1993.

Banks, J., Carson J., and B. Nelson, *Discrete-Event System Simulation*, Prentice Hall, 2000.

Birge, J, and F. Louveaux, *Introduction to Stochastic Programming*, Springer, New York, 1997.

Bolch, G., S. Greiner, H. de Meer, and K. Trivedi, *Queueing Networks and Markov Chains: Modeling and Performance Evaluation with Computer Science Applications*, Wiley, 1998.

Bouleau, N. and D. Lepingle, *Numerical Methods for Stochastic Processes*, John Wiley, 1994.

Cairolì, R., R. and Dalang *Sequential Stochastic Optimization*, Wiley, 1995.

Cassandras, C, *Discrete Event Systems: Modeling and Performance Analysis*, Irwin, 1993.

Cassandras, C., and S. Lafortune, *Introduction to Discrete Event Systems*, Kluwer Academic Pub., 1999.

De Cogan, D. and A. De Cogan, *Applied Numerical Modelling For Engineers*, Oxford University Press, 1997.

Evans, J., and D. Olson, *Introduction to Simulation and Risk Analysis*, Prentice Hall, 2002.

Feldman, Ph., *Discrete-Event Simulation for Performance Evaluation Systems With Algorithms and Example in C and C++*, Wiley, 2000.

Fishman, G., *Discrete-Event Simulation: Modeling, Programming and Analysis*, Springer-Verlag, Berlin, 2001.

Fishman, G., *Monte Carlo: Concepts, Algorithms and Applications*, Springer-Verlag, New York, 1996.

Fu, M., and J.Q. Hu, *Conditional Monte Carlo: Gradient Estimation and Optimization Applications*, Kluwer Academic Pub., 1997.

Gamerman, D., *Markov Chain Monte Carlo: Stochastic Simulation for Bayesian Inference*, CRC Press, 1997.

Ghosh, S., and T. Lee, *Modeling & Asynchronous Distributed Simulation: Analyzing Complex Systems*, IEEE Publications, 2000.

Gilbert, G., and K. Troitzsch, *Simulation for the Social Scientist*, Open Univ. Press, 1999.

- Gimblett, R., *Integrating Geographic Information Systems and Agent-Based Modeling: Techniques for Simulating Social and Ecological Processes*, Oxford University Press, 2002.
- Harrington, J., and K. Tumay, *Simulation Modeling Methods: To Reduce Risks and Increase Performance*, McGraw-Hill, 2000. CD-ROM included.
- Haas, P., *Stochastic Petri Net Models Modeling and Simulation*, Springer Verlag, 2002.
- Haverkort, B., *Performance of Computer-Communication Systems*, John Wiley and Sons, 1998.
- Hill, D., *Object-Oriented Analysis and Simulation Modeling*, Addison-Wesley, 1996.
- Hoppensteadt, F., and Ch. Peskin, *Modeling and Simulation in Medicine and the Life Sciences*, Springer-Verlag, 2002.
- Jeruchim, M., Ph. Balaban, and K. Shanmugan, (eds.), *Simulation of Communication Systems: Modeling, Methodology, and Techniques*, Plenum Pub Corp., 2001.
- Khoshnevis, B., *Discrete Systems Simulation*, McGraw-Hill, New York, 1994.
- Knepell, P., *Simulation Validation and Confidence Assessment Methods*, IEEE COMP SOC., 1993.
- Kulkarni, V., *Modeling and Analysis of Stochastic Systems*, Chapman & Hall, 1995.
- Kumar, P., and P. Varaiya, (eds.), *Discrete Event Systems, Manufacturing Systems, and Communication Networks*, Springer Verlag, 1995.
- Lindemann, Ch., *Performance Modelling with Deterministic and Stochastic Petri Nets*, John Wiley & Sons 1998.
- Ljung, L., G. Pflug, and H. Walk, *Stochastic Approximation and Optimization of Random Systems*, Birkhauser, 1992.
- Madu, Ch., and Ch-H. Kuei, *Experimental Statistical Designs and Analysis in Simulation Modeling*, Greenwood Publishing Group, 1993.
- Marek, P., *Simulation Based Reliability Assessment*, CRC PRESS, INC, 1996.
- Nelson, B., *Stochastic Modeling: Analysis & Simulation*, McGraw-Hill, 1995.
- Oakshott, L., *Business Modelling and Simulation*, Pitman Publishing, London, 1997.
- Passino, K., and K. Burgess, *Stability Analysis of Discrete Event Systems*, Wiley, 1998.
- Pidd, M., *Tools for Thinking: Modelling in Management Science*, Wiley, 1997.
- Pidd, M., *Computer Simulation in Management Science*, Wiley, 1998.
- Pollatschek, M., *Programming Discrete Simulations*, Publishers Group West, 1996.
- Pooch, U., and J. Wall, *Discrete Event Simulation: A Practical Approach*, CRC Press, 1993.
- Pritsker A., *Introduction to Simulation & SLAM II*, Wiley, 1995.
- Pritsker A., J. O'Reilly, and D. LaVal, *Simulation with Visual SLAM and AweSim*, Wiley, 1997.

- Profozich d., *Managing Change with Business Process Simulation*, Prentice Hall, 1997.
- Robert C., and G. Casella, *Monte Carlo Statistical Methods*, Springer, 1999.
- Roberts N., D. Anderson, and R. Deal, *Introduction to Computer Simulation: Systems Dynamics Modeling Approach*, Productivity Press, 1997.
- Robinson, S., *Successful Simulation: A Practical Approach to Simulation Projects*, McGraw-Hill, 1994.
- Romanowicz, B., *Methodology for the Modeling and Simulation of Microsystems*, Kluwer Academic Publishers, 1998.
- Rubinstein, R., and A. Shapiro, *Discrete Event Systems: Sensitivity Analysis and Stochastic Optimization*, Wiley, 1993.
- Sadiku, M., and M. Ilyas, *Simulation of Local Area Networks*, CRC Press, 1995
- Sarjoughian, H., and F. Cellier (eds.), *Discrete Event Modeling and Simulation: Enabling Future Technologies*, Springer Verlag, 2000.
- Sobol, I., *A Primer for the Monte Carlo Method*, CRC Press, 1994.
- Stender J., and E. Hillebrand, (eds.), *Genetic Algorithms in Optimisation, Simulation and Modelling*, IOS Press, 1994.
- Tezuka, Sh., *Uniform Random Numbers: Theory and Practice*, Kluwer Academic Publishers, 1995.
- Thesen, A., and L. Travis, *Simulation for Decision Making*, PWS Publishing Company, 1995.
- Severance, F., *System Modeling and Simulation: An Introduction*, Wiley, 2001.
- Tornambe, A., *Discrete-event System Theory: An Introduction*, World Scientific, 1995.
- Ulrich, E., V. Agrawal, and J. Arabian, *Concurrent and Comparative Discrete Event Simulation*, Kluwer Academic, 1994
- Van den Bosch, P. and A. Van der Klauw, *Modeling, Identification & Simulation of Dynamical Systems*, CRC Press, 1994.
- Viswanadham, N., and Y. Narahari, *Performance Modeling of Automated Manufacturing Systems*, Prentice Hall, 1992.
- Vose, D., *Quantitative Risk Analysis: A Guide to Monte Carlo Simulation Modelling*, Wiley, Chichester, 1996.
- Vose D., *Risk Analysis: A Quantitative Guide*, John Wiley & Sons, 2000.
- Watkins, K., *Discrete Event Simulation in C*, McGraw-Hill, 1994.
- Weinberg, G., *An Introduction to General Systems Thinking*, Dorset House, 2001.
- Wilson, W., *Simulating Ecological and Evolutionary Systems in C*, Cambridge University Press, 2000.

Winston, W., *Financial Models Using Simulation and Optimization*, Palisade Corporation, 1998.

Woods, R., and K. Lawrence, *Modeling and Simulation of Dynamic Systems*, Prentice Hall, 1997.

Yin, G., and Q. Zhang, (Eds.), *Mathematics of Stochastic Manufacturing Systems*, American Mathematical Society, 1997.

Simulation Language Specific

Harrell, C., B. G. Ghosh, and R. Bowden, *Simulation Using ProModel*, McGraw-Hill, 2000.

Hauge, J., and K. Paige, *Learning SIMUL8: The Complete Guide*, NovaSim Company, Bellingham, WA, 2001.

Karian, Z., and E. Dudewicz, *Modern Statistical Systems and GPSS Simulation*, CRC Press, 1998.

Kelton, W., R. Sadowski, and D. Sadowski, *Simulation with Arena*, McGraw-Hill, 1998.

Pegden, C., *Introduction to Simulation Using SIMAN*, McGraw Hill, 1995.

Pegden, P., *Computer Simulation/Verification: Introduction to Simulation Using SIMAN*, WCB/McGraw-Hill, 1995.

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Ahrweiler, P., and N. Gilbert, (Eds.), *Computer Simulations in Science and Technology Studies*, Springer, 1987.

Birtwistle, G., *DEMOS: Discrete Event Modelling on Simula*, MacMillan, 1979.

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Clymer, J., *Systems Analysis Using Simulation and Markov Models*, Prentice Hall, 1990.

Curry, G., et al., *Discrete Simulation: Fundamental and Microcomputer Support*, Holden Day, 1989.

Dagpunar, J., *Principles of Random Variate Generation*, Clarendon Press, Oxford, 1988.

Delaney, W., and E. Vaccari, *Dynamic Models and Discrete Event Simulation*, Dekker, 1989.

Elzas, M., T. Oren, and B. Zeigler (eds.), *Modelling and Simulation Methodology: Knowledge Systems Paradigms*, North-Holland, 1989.

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- Fishman, G., *Principles of Discrete Event Simulation*, Wiley, 1978.
- Fishman, G., *Concepts and Methods in Discrete Event Digital simulation*, Wiley, 1973.
- Hammersley, J., and D. Handscomb, *Monte Carlo Methods*, Chapman and Hall, London, 1964.
- Hishman, G., *Principles of Discrete Event Simulation*, John Wiley, New York, 1978.
- Ho, Y., *Discrete Event Dynamic Systems*, IEEE press, 1992.
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- Maurice, A., *Computer Simulation of Dynamic Systems*, Dubuque, Iowa, 1988.
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- Nersesian, R., *Computer Simulation in Business Decision Making: A Guide for Managers, Planners, and MIS Professionals*, Quorum Books, New York, 1989.
- Noreen, E., *Computer Intensive Methods for Testing Hypotheses: An Introduction*, Wiley, 1989.
- Pandu, R. Tadikamalla P., (ed.), *Modern Digital Simulation Methodology: Input, Modeling, and Output*, Amer. Sciences Pr., 1985.
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- Reitman, J., *Computer Simulation Applications: Discrete-Event Simulation for Synthesis and Analysis of Complex Systems*, Krieger Publishing Co., 1981.
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