BOOK REVIEW

L. Finkelstein and E. R. Carson, *Mathematical Modeling of Dynamic Biological Systems*, Research Studies Press, Forest Grove, Ore., 1979, 324 pp. + index; $34.50.

This is an introductory text on systems analysis and modeling with emphasis on linear systems. Its expressed purpose is to teach scientists in biology and medicine how to formulate and solve mathematical models of biological systems. The authors assume little mathematical background on the part of the reader; the basic ideas of differentiation and integration are presented briefly in an appendix.

Some idea of the scope of the book is given by the chapter titles. These are: 1. Dynamics and Control in Biology; 2. Dynamics of First and Second Order Linear Systems; 3. Time Domain Analysis; 4. Transfer Functions; 5. Graphical Representation of Dynamic Systems; 6. Non-Linear Dynamic Systems; 7. Feedback; 8. Formulation of Mathematical Models; 9. Introduction to the Identification and Validation of Mathematical Models of Dynamic Systems; 10. Time-Discrete Systems; 11. Computer Simulation.

What is good about it? Some of the discussion of modeling in Chapter 8 and of identification and validation in Chapter 9 is well done. What is poor or badly done? There is too much of the flavor of the cookbook in it. In Chapter 6 the authors use perturbation theory to obtain the equations of tracer flow in a nonlinear system. This may lead to error and should be discouraged. The perturbation method always gives the correct equations for tracer flow in linear systems. It does not always work with nonlinear systems, because the tracer and the total perturbation are no longer the same. In Chapter 9 there is no separation of the ideas of identifiability from the statistical estimation problem.

Will this book serve for its intended purpose? Perhaps, but the mathematical methods are served up as so many recipes, so I doubt that many biologists who are mathematically unsophisticated will learn to use these tools insightfully. And for the biologist who is capable in mathematical modeling the presentation is at too simple a level.

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