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Learning modelling with DERIVE. (English)

London: Prentice Hall. xiii, 244 p. \$ 25.95 (1995). [ISBN 0-13-190521-X]

This is a very nice book on mathematical modelling. Solutions of the models developed are given using the Computer Algebra system DERIVE.

The book covers the following topics: General remarks on mathematical modelling; Trigonometric models (for example: the right turn of a car, billiard, tumble drier design, stagger for the lanes of an athletics track); Algebraic models (for example: parallel algorithms and transputers, forest management); Optimization models (for example: scheduling, lotteries and raffles, optimizing sport performances, tin can manufacture); Statistical modelling (for example: trends in olympic performance, winning at Badminton, biological data modelling); Modelling with differential equations (for example: population dynamics, predator-prey model, drug transport, projectiles with spin, learning with minimum effort); Modelling with recurrence equations (for example: Fibonacci numbers, mortgage repayments, dish washing, satellite television); Dimensional analysis.

To all the given examples the same scheme is applied: The problem is stated; features of a model are set up; a mathematical formulation of the problem is given; and finally the mathematical problem is solved. Then in some instances refined models are discussed. DERIVE is used only in the last step, when solving the mathematical problem (hence the title of the book is a little misleading). Some of the examples are well-known (for example: population dynamics, predator-prey model), however most are exclusive, and all are interesting.

Software development is fast, hence the used version of DERIVE is no longer valid. In the meantime, DERIVE for Windows is on the market. Therefore, the book's DERIVE details are obsolete. Since moreover, in most cases, the part to use DERIVE is completely left to the reader, and only hints are given, I doubt that every reader can follow the instructions to find the solutions. On the other hand, the models treated are so exciting that I can recommend the book to everybody.

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Keywords : mathematical modeling; differential equations; recurrence equations; DERIVE

Classification:

- 00A71 Theory of mathematical modeling
- 68Q40 Symbolic computation, algebraic computation
- 68W30 Symbolic computation and algebraic computation
- 68Q10 Modes of computation