Book review

S. Lynch, Dynamical Systems with Applications using MAPLE. Birkhäuser, Boston, 2000. ISBN 0-8176-4150-5.

According to the author, "this book provides an introduction to the theory of dynamical systems with the aid of the Maple manipulation package". Throughout the book Maple is viewed as a tool for solving systems or producing eye-catching graphics.

The idea that dynamical systems ought to go with computerized algebra is not so trivial as it may seem. Indeed, one could ask several nagging questions: Why should we overburden students with some computer packages? Is not the basic theory enough for the student? What if the instructor is not familiar with the package?

The latter question is a most simple to answer. If the instructor does not like symbolic algebra, naturally he or she will not use this book. And this will be a loss.

Indeed, very often if not always, analytical derivations must be accompanied with the attendant computation, and graphics. In order this stage to be least time-consuming, it is of great advantage to have computational tools. The latter often is of approximate nature. How much more useful theory will be if the computations were exact! Computer algebra, "an able assistant" (if not a "butler") does exactly this. About graphics: no one will disagree that one picture is worth many words. Thus, using Maple (or Mathematica, or Reduce, or Maxima, or else), puts all of these together. Thus, we get the most up-to-date, but also philosophically sound basis for rigorous instruction.

Book contains 22 chapters, but note, there is also a zeroth chapter, representing a tutorial introduction into Maple. It covers differential equations, linear systems in plane, nonlinear systems in the plane, limit cycles, Hamiltonian systems, Lyapunov functions, bifurcation theory, chaos, Poincaré maps, linear and nonlinear discrete dynamical systems, complex iterative maps, fractals, and yes, controlling chaos.

Chapter 21 contains examination type questions, whereas chapter 22 lists solutions to exercises.

To sum up this is an extremely useful book that can be used not only in the classroom, but also for self-education.

It is recommended for structural dynamicists to widen their horizons. Symbolic algebra (devoid of "number crunching") is a modern-day revolution and cannot be overlooked by the "traditionalists"; this book combines "traditions" and symbolic derivations plus graphics in a nicely integrated manner. It is highly recommended.

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