

study of first integrals and Poincaré–Bendixson theory. There is no attempt even to sketch a proof of the main theorems.

Applications appear mainly in chapters four and five, separated from the theory. A reader would miss a very great deal if he omitted these chapters. Specific applications are both “classical and modern”. As well as the usual mechanical and electrical oscillations, there is an application of the linear theory in economics for which “negative damping” has a meaningful interpretation. Applications of the non-linear theory include competing species, prey–predator eco-systems, relaxation, regularisation, Liénard equation, further economic models, the Zeeman heartbeat and nerve impulse models, Liapunov functions, bifurcation, and a model for tumour growth. Care is taken to explain the thinking, both mathematical and non-mathematical, involved in each modelling process. This most difficult and important aspect of the applied mathematician’s work is so often neglected because it is difficult to teach. There is a satisfying thoroughness about the treatment of these examples. For instance, the authors are not content to describe the Volterra–Lotka prey–predator model (as appears in many textbooks), but take the opportunity to teach valuable lessons by criticising it, and putting forward the more sophisticated Holling–Tanner model.

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BOOKS RECEIVED

- M. KLINE, *Mathematics: the loss of certainty* (Oxford University Press), paper £4.95.
 C. BANDELOW, *Inside Rubik’s cube and beyond* (Birkhäuser Verlag), paper £5.35.
Collected papers of J. E. Littlewood (ed. by a Committee appointed by the London Mathematical Society) (Oxford University Press), 2 vols. each £60.
 R. D. MAULDIN (ed.), *The Scottish book: mathematics from the Scottish Café* (Birkhäuser Verlag), £18.
 P. HALL, *Rates of convergence in the central limit theorem* (Pitman), £10.50.
 J. M. HILL, *Solution of differential equations by means of one-parameter groups* (Pitman), £8.50.
 M. S. P. EASTHAM, *Schrödinger-type operators with continuous spectra* (Pitman), £12.50.
 S. C. POWER, *Hankel operators on Hilbert space* (Pitman), £7.
 S. CAMPBELL (ed.), *Recent applications of generalized inverses* (Pitman), £11.
 P.-L. LIONS, *Generalized solutions of Hamilton-Jacobi equations* (Pitman), £12.50.