



Applications of Lie's Theory of Ordinary and Partial Differential Equations, *L. Dresner*, IOP Publishing, 1999, ISBN 0750305304 (hc) / 0750305312 (pbk); Price: US\$90/\$27

There have been many books written about Lie's theory of differential equations. This particular textbook provides a concise, simple introduction to selected applications of Lie's theory of differential equations to problems relating to diffusion, wave motion, shocks and propagation. Riemann's method of characteristics, the calculus of variance and the Euler-Lagrange equation are presented. Lie's reduction theorem, group invariants, stretching groups and Nöther's theorem are introduced in Chapter 3, midway through the book.

Theorems are presented without rigour and their applications are illustrated by the examples that follow each. These include the Thomas-Fermi equation and the Emden-Fowler equation describing equilibrium mass distribution in a gas cloud held together by gravitation. Each chapter has a challenging set of student problems, with complete solutions at the back of the book. I found these problems to be well thought-out and informative.

This textbook is written in the clear and concise style of Courant and Hilbert's *Methods of Mathematical Physics*, but without complete derivations. It is designed as a short monograph in the familiar Methuen style, to get the reader "up and running" in the subject matter as speedily as practicable. The author does make reference to more extensive textbooks where necessary.

On my shelf, Dresner's book stands between Boyce and Diprima's *Elementary Differential Equations and Boundary Value Problems* and Courant and Hilbert's *Methods of Mathematical Physics*.

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