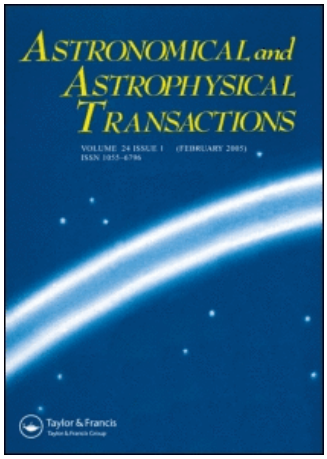

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Dynamics of Galaxies

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Book Review

DYNAMICS OF GALAXIES

by G. Bertin

Cambridge University Press, Cambridge, 2000,
430 Pages + 18 halftones, 90 line diagrams, 18 tables
Hardback 0-521-47262-8, $95.00
Paperback 0-521-47855-3, $34.95.

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Giuseppe Bertin is Professor of Theoretical Astrophysics at the Scuola Normale Superiore in Pisa, Italy. He has held several positions at the Massachusetts Institute of Technology, and is the author of *Spiral Structure in Galaxies: A Density Wave Theory* with C.C. Lin. *Dynamics of Galaxies* is a synthesis of two graduate courses: one given at MIT in 1985 and another given regularly over the past 15 years at the Scuola Normale. This new book is addressed both to students interested in undertaking research in an advanced and exciting area of astrophysics and to those specializing in, for example, plasma physics, geophysics, or applied mathematics who wish to acquire an overall view of an interesting research field.

This book is addressed to a readership of first-year graduate students and alone. Therefore, although rich in quantitative analysis, the book reduces the mathematical discussion to its essentials. The level of presentation is not excessively technical. In contrast with other monographs on related subjects, *Dynamics of Galaxies* emphasizes the physical and methodological aspects. Particularly from the methodological point of view, the book focuses on the general use of asymptotic methods, and it gives in detail the mathematical structure of some derivations when these may be useful for more general purposes. Asymptotic methods are flexible tools for obtaining approximate solutions that give priority to the richness of ingredients in a physical problem. Technically speaking, these methods recognize the importance of singular perturbations in the realization of physical processes. These aspects are often overlooked in toy models with exact solutions. The mathematical description developed in the book is not meant to provide a set of 'recipes' for astronomical applications; rather, it serves to develop the reader's physical intuition and understanding of the processes involved.

The first two parts of the book define the astrophysical problems and the methods for building sound physical models. The next part examines the observational properties and models of spiral and elliptical galaxies. A selection of exciting topics from contemporary research are also reviewed, including the formation and evolution of galaxies, cooling flows, accretion disks, and galaxies at high redshift.

The problems provided in this book are primarily meant to offer the opportunity for additional discussion of a few selected points that are considered interesting. In many cases the resolution is very simple and the problem is an excuse to emphasize the scales associated with some important quantities. In other cases the resolution may require a non-trivial analytical discussion or a simple numerical investigation. Sometimes the problem offers a way to focus on some derivation aspects that are considered instructive. In a few cases, the problems are straightforward exercises that involve a routine application of formulae provided in the main text.

CONTENTS

Our understanding of galaxies has advanced significantly in recent years. Powerful computer simulations and detailed observations from ground- and space-based telescopes have been instrumental in this. This graduate textbook provides students with a complete, accessible introduction to modern galactic dynamics and helps equip them with useful tools and sound intuition for further research. Throughout, the volume helps students develop a clear understanding and good physical intuition of the processes involved. Full derivations are provided for key results and helpful problems are included.

Let me finish the review by sharing opinion of Professor Tjeerd S. van Albada (Groningen University, The Netherlands): 'Bertin takes an Olympian view of this complex field and describes it with remarkable clarity and depth'.

V.G. SURDIN