

Contents

| | |
|--|------------|
| Acknowledgements | vii |
| Introduction | 1 |
| 1 Completely integrable systems | 2 |
| 2 The Arnold-Liouville theorem | 5 |
| 3 A discourse on the method | 6 |
| 4 About this book | 11 |
| 5 Notation | 13 |
| I The rigid body with a fixed point | 15 |
| 1 The equations | 15 |
| 2 The question of integrability | 18 |
| 3 The three-dimensional free rigid body and the Euler-Poinsot case | 21 |
| II The symmetric spinning top | 27 |
| 1 Introduction to the symmetric spinning top | 27 |
| 2 A Lax pair and what follows | 32 |
| III The Kowalevski top | 45 |
| 1 Kowalevski's method | 45 |
| 2 Lax pair and spectral curves | 52 |
| 3 Lax pairs for generalised spinning tops and applications | 60 |
| IV The free rigid body | 65 |
| 1 The Euler and Manakov equations | 65 |
| 2 The dimension-3 free rigid body | 66 |
| 3 Remarks on the dimension-4 rigid body | 69 |
| V Non-compact levels: a Toda lattice | 77 |
| 1 The differential system and the spectral curve | 77 |
| 2 The eigenvector mapping: the $n = 2$ case | 83 |

| | |
|---|------------|
| Appendices | 91 |
| Appendix 1 A Poisson structure on the dual of a Lie algebra | 91 |
| Appendix 2 R -matrices and the “AKS theorem” | 98 |
| Appendix 3 The eigenvector mapping and linearising flows | 104 |
| Appendix 4 Complex curves, real curves and their Jacobians | 113 |
| Appendix 5 Prym varieties | 124 |
| References | 131 |
| Index | 137 |