

World Scientific Monograph Series
in Mathematics – Vol. 6

Hamiltonian Systems and Celestial Mechanics (HAMSYS-98)

Proceedings of the
III International Symposium

Pátzcuaro, Michoacán, México 7 – 11 December 1998

editors

J. Delgado, E. A. Lacomba, E. Pérez-Chavela
Universidad Autónoma Metropolitana-Iztapalapa, México

J. Llibre
Universitat Autònoma de Barcelona, Spain

 **World Scientific**
Singapore • New Jersey • London • Hong Kong



CONTENTS

| | |
|--|-----|
| Preface | vii |
| The Rhomboidal Charged Four Body Problem <i>F. Alfaro and E. Pérez-Chavela</i> | 1 |
| Planetary Rings with Shepherds <i>L. Benet and T.H. Seligman</i> | 20 |
| Low Reynolds Number Swimming in Two Dimensions <i>A. Cherman, J. Delgado, F. Duda, K. Ehlers, J. Koiller and R. Montgomery</i> | 32 |
| 2-Dimensional Invariant Tori for the Spatial Isosceles 3-Body Problem <i>M. Corbera and J. Llibre</i> | 63 |
| The Global Flow for the Synodical Spatial Kepler Problem <i>M.P. Dantas and J. Llibre</i> | 74 |
| Unbounded Growth of Energy in Periodic Perturbations of Geodesic Flows of the Torus <i>A. Delshams, R. De La Llave and T.M. Seara</i> | 90 |
| Splitting and Melnikov Potentials in Hamiltonian Systems <i>A. Delshams and P. Gutiérrez</i> | 111 |
| Infinity Manifolds of Cubic Polynomial Hamiltonian Vector Fields with 2 Degrees of Freedom <i>M. Falconi, E.A. Lacomba and J. Llibre</i> | 138 |

| | |
|---|-----|
| Relativistic Corrections to Elementary Galilean Dynamics and Deformations of Poisson Brackets <i>R. Flores-Espinoza and Yu.M. Vorobjev</i> | 161 |
| Heteroclinic Phenomena in the Sitnikov Problem <i>A. García and E. Pérez-Chavela</i> | 174 |
| Doubly-Symmetric Periodic Solutions of Hill's Lunar Problem <i>R.C. Howison and K.R. Meyer</i> | 186 |
| On Practical Stability Regions for the Motion of a Small Particle Close to the Equilateral Points of the Real Earth–Moon System <i>Á. Jorba</i> | 197 |
| Variational Methods for Quasi-Periodic Solutions of Partial Differential Equations <i>R. de la Llave</i> | 214 |
| The Splitting of Invariant Lagrangian Submanifolds: Geometry and Dynamics <i>J.-P. Marco</i> | 229 |
| Cross-Sections in the Planar N -Body Problem <i>C. McCord</i> | 250 |
| Existence of an Additional First Integral and Completeness of the Flow for Hamiltonian Vector Fields <i>J. Muciño-Raymundo</i> | 261 |
| Simplification of Perturbed Hamiltonians Through Lie Transformations <i>J. Palacián and P. Yanguas</i> | 284 |

| | |
|--|-----|
| Linear Stability in the $1 + N$ -Gon Relative Equilibrium <i>G.E. Roberts</i> | 303 |
| Analytic Continuation of Circular and Elliptic Kepler Motion to the General 3-Body Problem <i>J. Soler</i> | 331 |
| The Phase Space of Finite Systems <i>K.B. Wolf, N.M. Atakishiyev and S.M. Chumakov</i> | 349 |