

Extended Abstracts

Spring 2014

Hamiltonian Systems and Celestial
Mechanics

Montserrat Corbera
Josep Maria Cors
Jaume Llibre
Editors

Virus Dynamics and Evolution

Andrei Korobeinikov
Editor



Birkhäuser

Editors

Montserrat Corbera

Departament de Tecnologies Digitals,
Campus Torre dels Frares
Universitat de Vic
Vic, Spain

Jaume Llibre

Departament de Matemàtiques
Universitat Autònoma de Barcelona
Barcelona, Spain

Josep Maria Cors

Departament de Matemàtica Aplicada III
Universitat Politècnica de Catalunya
Manresa, Spain

Andrei Korobeinikov

Centre de Recerca Matemàtica
Barcelona, Spain

ISSN 2297-0215

Trends in Mathematics

ISBN 978-3-319-22128-1

DOI 10.1007/978-3-319-22129-8

ISSN 2297-024X (electronic)

ISBN 978-3-319-22129-8 (eBook)

Library of Congress Control Number: 2015954093

Mathematics Subject Classification (2010): First part: 34C25, 34C29, 65P30, 70H05; Second part:
92D15, 92D25, 92D30

Springer Cham Heidelberg New York Dordrecht London

© Springer International Publishing Switzerland 2015

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media
(www.birkhauser-science.com)

Contents

Part I Hamiltonian Systems and Celestial Mechanics

On the Force Fields Which Are Homogeneous of Degree -3	3
Alain Albouy	
Bifurcations of the Spatial Central Configurations in the 5-Body Problem	9
Martha Álvarez-Ramírez, Motserrat Corbera, and Jaume Llibre	
Convex Central Configurations of Two Twisted n-gons	17
Esther Barrabés and Josep Maria Cors	
The Newtonian n-Body Problem in the Context of Curved Space	23
Florin Diacu	
Poincaré Maps and Dynamics in Restricted Planar ($n + 1$)-Body Problems	27
Antonio García	
A Methodology for Obtaining Asymptotic Estimates for the Exponentially Small Splitting of Separatrices to Whiskered Tori with Quadratic Frequencies	31
Amadeu Delshams, Marina Gonchenko, and Pere Gutiérrez	
Homoclinic and Heteroclinic Orbits for a Class of Singular Planar Newtonian Systems	39
Joanna Janczewska	
Transport Dynamics: From the Bicircular to the Real Solar System Problem	45
Mercè Ollé, Esther Barrabés, Gerard Gómez, and Josep Maria Mondelo	

Quasi-Periodic Almost-Collision Motions in the Spatial Three-Body Problem.....	49
Jesús F. Palacián, Flora Sayas, and Patricia Yanguas	
Generalized Discrete Nonlinear Schrödinger as a Normal Form at the Thermodynamic Limit for the Klein–Gordon Chain.....	53
Simone Paleari and Tiziano Penati	
Stability of Euler-Type Relative Equilibria in the Curved Three Body Problem	59
Ernesto Pérez-Chavela and Juan Manuel Sánchez Cerritos	
Two-Dimensional Symplectic Return Maps and Applications	65
Regina Martínez and Carles Simó	
Central Configurations of an Isosceles Trapezoidal Five-Body Problem	71
Abdulrehman Kashif, Muhammad Shoaib, and Anoop Sivasankaran	
The Discrete Hamiltonian–Hopf Bifurcation for 4D Symplectic Maps	77
Ernest Fontich, Carles Simó, and Arturo Vieiro	
Moment Map of the Action of $SO(3)$ on $\mathbb{R}^3 \times \mathbb{R}^3$	83
José Antonio Villa Morales	
Part II Virus Dynamics and Evolution	
Modelling Infection Dynamics and Evolution of Viruses in Plant Populations.....	89
Aurora Fraile and Fernando García-Arenal	
The Spread of Two Viral Strains on a Plant Leaf	95
Juan Carlos Cantero-Guardeño, Vladimir Sobolev, and Andrei Korobeinikov	
Tracking the Population Dynamics of Plant Virus Escape Mutants.....	101
Santiago F. Elena	
Evolutionary Escape in Populations with Genotype-Phenotype Structure	107
Esther Ibáñez-Marcelo and Tomás Alarcón	
Evolution of Stalk/Spore Ratio in a Social Amoeba: Cell-to-Cell Interaction via a Signaling Chemical Shaped by Cheating Risk.....	113
Yoh Iwasa	
Within-Host Viral Evolution Model with Cross-Immunity	119
Narani van Laarhoven and Andrei Korobeinikov	

Modelling Viral Evolution and Adaptation	125
Susanna Manrubia	
Changes in Codon-Pair Bias of Human Immunodeficiency Virus Type 1 Affect Virus Replication	131
Miguel Ángel Martínez	
Competing Neutral Populations of Different Diffusivity	137
Simone Pigolotti	
Density-Dependent Diffusion and Epidemics on Heterogeneous Metapopulations	143
Albert Avinyó, Marta Pellicer, Jordi Ripoll, and Joan Saldaña	
Are Viral Blips in HIV-1-Infected Patients Clinically Relevant?	149
Daniel Sánchez-Taltavull and Tomás Alarcón	
Models of Developmental Plasticity and Cell Growth	155
Graeme Wake	