CONTENTS

LECTURES

Annalisa Calini
INTEGRABLE DYNAMICS OF KNOTTED VORTEX FILAMENTS **11**
Introduction 11
Lecture 1 12
The Physical Model 12
The Hamiltonian Formulation 14
The Hasimoto Map 15
A Geometric Interpretation of the Hasimoto Map 16
Lecture 2 21
Some Consequences of Integrability 21
The Inverse of the Hasimoto Map 24
Closure Conditions 26
Lecture 3 29
Plane Waves to Circles: An Example 29
N-phase Solutions of the Vortex Filament Equations 31
Lecture 4 37
Use of Exact Formulas for N-phase Solutions 38
Perturbations of Multiply-covered Circles 38
Isoperiodic Deformations of NLS Potentials 42
Acknowledgements 47
References 47

Allen C. Hirshfeld
FERMIONS AND SUPERSYMMETRY **51**
1. Introduction 51
2. Pseudoclassical Mechanics 52
3. Quantization 53
4. The Bosonic Oscillator 55
5. The Fermionic Oscillator 57
6. The Supersymmetric Oscillator 61
7. Supersymmetric Quantum Mechanics 62
8. Non-relativistic Spin and the Pauli Equation 64

9. Relativistic Quantum Mechanics and the Dirac Equation 65
References 66

Peter J. Olver
AN INTRODUCTION TO MOVING FRAMES **67**
1. Introduction 67
2. Moving Frames 68
3. Prolongation and Differential Invariants 70
4. Equivalence and Signatures 73
5. Joint Invariants and Differential Invariants 75
References 79

Jan J. Sławianowski
CLASSICAL AND QUANTUM COLLECTIVE DYNAMICS OF DEFORMABLE OBJECTS. SYMMETRY AND INTEGRABILITY PROBLEMS **81**
1. Introduction 81
2. Hamiltonian Systems on Lie Groups 82
3. Geometric Description of Affinely-Rigid Body 89
4. Dynamical Affine Invariance of Geodetic Systems 95
5. Affine Systems Without Translational Motion. Geodetic Models 99
References 107

CONTRIBUTIONS

Beatrice Bucker
GEOMETRICAL APPROACHES TO THE QUANTIZATION OF GAUGE THEORIES **111**

Georgy I. Burde and Alexander Zhalij
SEPARABLE NON-PARALLEL AND UNSTEADY FLOW STABILITY PROBLEMS **131**

Metin Gürses and Kostyantyn Zheltukhin
POISSON STRUCTURES IN $\mathbb{R}^3$ **144**

Toshihiro Iwai
STRATIFIED REDUCTION OF MANY-BODY DYNAMICAL SYSTEMS **149**

Ivaïlo M. Mladenov
CONFORMAL IMMERSIONS OF DELAUNAY SURFACES AND THEIR DUALS **158**

Galia Nakova and Mancho Manev
CURVATURE PROPERTIES OF SOME THREE-DIMENSIONAL ALMOST CONTACT MANIFOLDS WITH B-METRIC, II **169**

Predrag M. Rajković, Miomir S. Stanković and Sladjana D. Marinković
THE ZEROS OF POLYNOMIALS ORTHOGONAL WITH RESPECT TO q-INTEGRAL ON SEVERAL INTERVALS IN THE COMPLEX PLANE . . . **178**

Enrique G. Reyes
ON PHASE SPACES AND THE VARIATIONAL BICOMPLEX (after G. ZUCKERMAN) **189**

Cheri Shakiban and Peter Lloyd
SIGNATURE CURVES STATISTICS OF DNA SUPERCOILS **203**

Dimitar A. Trifonov
POSITION UNCERTAINTY MEASURES ON THE SPHERE **211**

Abraham A. Ungar
THE HYPERBOLIC TRIANGLE DEFECT **225**

Nedialko Valkov
AN ATTEMPT TO USE MECHANICAL ENERGY CONSERVATION PRINCIPLE IN CASE OF CHANNEL DEVELOPED TURBULENT FLOW **237**

Vassil M. Vassilev and Ivaïlo M. Mladenov
GEOMETRIC SYMMETRY GROUPS, CONSERVATION LAWS AND GROUP-INVARIANT SOLUTIONS OF THE WILLMORE EQUATION **246**

Subject Index **266**
E-mail Addresses **268**