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KEY=KAM - AUGUSTUS MCCONNELL

CELESTIAL MECHANICS AND ASTRODYNAMICS: THEORY AND PRACTICE

Springer This volume is designed as an introductory text and reference book for graduate students, researchers and practitioners in the fields of astronomy, astrodynamics, satellite systems, space sciences and astrophysics. The purpose of the book is to emphasize the similarities between celestial mechanics and astrodynamics, and to present recent advances in these two fields so that the reader can understand the inter-relations and mutual influences. The juxtaposition of celestial mechanics and astrodynamics is a unique approach that is expected to be a refreshing attempt to discuss both the mechanics of space flight and the dynamics of celestial objects. "Celestial Mechanics and Astrodynamics: Theory and Practice" also presents the main challenges and future prospects for the two fields in an elaborate, comprehensive and rigorous manner. The book presents homogenous and fluent discussions of the key problems, rendering a portrayal of recent advances in the field together with some basic concepts and essential infrastructure in orbital mechanics. The text contains introductory material followed by a gradual development of ideas interweaved to yield a coherent presentation of advanced topics.

VLADIMIR I. ARNOLD - COLLECTED WORKS

REPRESENTATIONS OF FUNCTIONS, CELESTIAL MECHANICS, AND KAM THEORY 1957-1965

Springer Science & Business Media Vladimir Arnold is one of the greatest mathematical scientists of our time, as well as one of the finest, most prolific mathematical authors. This first volume of his Collected Works focuses on representations of functions, celestial mechanics and KAM theory.

REPORT TW.

ELEMENTS OF APPLIED BIFURCATION THEORY

Springer Science & Business Media Providing readers with a solid basis in dynamical systems theory, as well as explicit procedures for application of general mathematical results to particular problems, the focus here is on efficient numerical implementations of the developed techniques. The book is designed for advanced undergraduates or graduates in applied mathematics, as well as for Ph.D. students and researchers in physics, biology, engineering, and economics who use dynamical systems as model tools in their studies. A moderate mathematical background is assumed, and, whenever possible, only elementary mathematical tools are used. This new edition preserves the structure of the first while updating the context to incorporate recent theoretical developments, in particular new and improved numerical methods for bifurcation analysis.

CANONICAL PERTURBATION THEORIES

DEGENERATE SYSTEMS AND RESONANCE

Springer Science & Business Media The book is written mainly to advanced graduate and post-graduate students following courses in Perturbation Theory and Celestial Mechanics. It is also intended to serve as a guide in research work and is written in a very explicit way: all perturbation theories are given with details allowing its immediate application to real problems. In addition, they are followed by examples showing all steps of their application.

PHYSICAL REVIEW

STATISTICAL PHYSICS, PLASMAS, FLUIDS, AND RELATED INTERDISCIPLINARY TOPICS. E

DYNAMICAL SYSTEMS

THE THREE-BODY PROBLEM AND SPACE MISSION DESIGN

Springer This book considers global solutions to the restricted three-body problem from a geometric point of view. The authors seek dynamical channels in the phase space which wind around the planets and moons and naturally connect them. These low energy passageways could slash the amount of fuel spacecraft need to explore and develop our solar system. In order to effectively exploit these passageways, the book addresses the global transport. It goes beyond the traditional scope of libration point mission design, developing tools for the design of trajectories which take full advantage of natural three or more body dynamics, thereby saving precious fuel and gaining flexibility in mission planning. This is the key for the development of some NASA mission trajectories, such as low energy libration point orbit missions (e.g., the sample return Genesis Discovery Mission), low energy lunar missions and low energy tours of outer planet moon systems, such as a mission to tour and explore in detail the icy moons of Jupiter. This book can serve as a valuable resource for graduate students and advanced undergraduates in applied mathematics and aerospace engineering, as well as a manual for practitioners who work on libration point and deep space missions in industry and at government laboratories. the authors include a wealth of background material, but also bring the reader up to a portion of the research frontier.

ONE-DIMENSIONAL DYNAMICS

Springer Science & Business Media One-dimensional dynamics has developed in the last decades into a subject in its own right. Yet, many recent results are inaccessible and have never been brought together. For this reason, we have tried to give a unified ac count of the subject and complete proofs of many results. To show what results one might expect, the first chapter deals with the theory of circle diffeomorphisms. The remainder of the book is an attempt to develop the analogous theory in the non-invertible case, despite the intrinsic additional difficulties. In this way, we have tried to show that there is a unified theory in one-dimensional dynamics. By reading one or more of the chapters, the reader can quickly reach the frontier of research. Let us quickly summarize the book. The first chapter deals with circle diffeomorphisms and contains a complete proof of the theorem on the smooth linearizability of circle diffeomorphisms due to M. Herman, J.-C. Yoccoz and others. Chapter II treats the kneading theory of Milnor and Thurstonj also included are an

exposition on Hofbauer's tower construction and a result on fuB multimodal families (this last result solves a question posed by J. Milnor).

DYNAMICAL SYSTEMS III

Springer Science & Business Media This work describes the fundamental principles, problems, and methods of elassical mechanics focussing on its mathematical aspects. The authors have striven to give an exposition stressing the working apparatus of elassical mechanics, rather than its physical foundations or applications. This appara tus is basically contained in Chapters 1, 3,4 and 5. Chapter 1 is devoted to the fundamental mathematical models which are usually employed to describe the motion of real mechanical systems. Special consideration is given to the study of motion under constraints, and also to problems concerned with the realization of constraints in dynamics. Chapter 3 is concerned with the symmetry groups of mechanical systems and the corresponding conservation laws. Also discussed are various aspects of the theory of the reduction of order for systems with symmetry, often used in applications. Chapter 4 contains abrief survey of various approaches to the problem of the integrability of the equations of motion, and discusses some of the most general and effective methods of integrating these equations. Various elassical examples of integrated problems are outlined. The material pre sen ted in this chapter is used in Chapter 5, which is devoted to one of the most fruitful branches of mechanics - perturbation theory. The main task of perturbation theory is the investigation of problems of mechanics which are" elose" to exact1y integrable problems.

NONLINEAR DYNAMICAL SYSTEMS AND CHAOS

Birkhäuser Symmetries in dynamical systems, "KAM theory and other perturbation theories", "Infinite dimensional systems", "Time series analysis" and "Numerical continuation and bifurcation analysis" were the main topics of the December 1995 Dynamical Systems Conference held in Groningen in honour of Johann Bernoulli. They now form the core of this work which seeks to present the state of the art in various branches of the theory of dynamical systems. A number of articles have a survey character whereas others deal with recent results in current research. It contains interesting material for all members of the dynamical systems community, ranging from geometric and analytic aspects from a mathematical point of view to applications in various sciences.

INTRODUCTION TO MECHANICS AND SYMMETRY

A BASIC EXPOSITION OF CLASSICAL MECHANICAL SYSTEMS

Springer Science & Business Media A development of the basic theory and applications of mechanics with an emphasis on the role of symmetry. The book includes numerous specific applications, making it beneficial to physicists and engineers. Specific examples and applications show how the theory works, backed by up-to-date techniques, all of which make the text accessible to a wide variety of readers, especially senior undergraduates and graduates in mathematics, physics and engineering. This second edition has been rewritten and updated for clarity throughout, with a major revamping and expansion of the exercises. Internet supplements containing additional material are also available.

MATHEMATICAL REVIEWS

OXFORD USERS' GUIDE TO MATHEMATICS

Oxford University Press The Oxford Users' Guide to Mathematics is one of the leading handbooks on mathematics available. It presents a comprehensive modern picture of mathematics and emphasises the relations between the different branches of mathematics, and the applications of mathematics in engineering and the natural sciences. The Oxford User's Guide covers a broad spectrum of mathematics starting with the basic material and progressing on to more advanced topics that have come to the fore in the last few decades. The book is organised into mathematical sub-disciplines including analysis, algebra, geometry, foundations of mathematics, calculus of variations and optimisation, theory of probability and mathematical statistics, numerical mathematics and scientific computing, and history of mathematics. The book is supplemented by numerous tables on infinite series, special functions, integrals, integral transformations, mathematical statistics, and fundamental constants in physics. It also includes a comprehensive bibliography of key contemporary literature as well as an extensive glossary and index. The wealth of material, reaching across all levels and numerous sub-disciplines, makes The Oxford User's Guide to Mathematics an invaluable reference source for students of engineering, mathematics, computer science, and the natural sciences, as well as teachers, practitioners, and researchers in industry and academia.

SOLVED PROBLEMS IN LAGRANGIAN AND HAMILTONIAN MECHANICS

Springer Science & Business Media The aim of this work is to bridge the gap between the well-known Newtonian mechanics and the studies on chaos, ordinarily reserved to experts. Several topics are treated: Lagrangian, Hamiltonian and Jacobi formalisms, studies of integrable and quasi-integrable systems. The chapter devoted to chaos also enables a simple presentation of the KAM theorem. All the important notions are recalled in summaries of the lectures. They are illustrated by many original problems, stemming from real-life situations, the solutions of which are worked out in great detail for the benefit of the reader. This book will be of interest to undergraduate students as well as others whose work involves mechanics, physics and engineering in general.

INTRODUCTION TO HAMILTONIAN DYNAMICAL SYSTEMS AND THE N-BODY PROBLEM

Springer This third edition text provides expanded material on the restricted three body problem and celestial mechanics. With each chapter containing new content, readers are provided with new material on reduction, orbifolds, and the regularization of the Kepler problem, all of which are provided with applications. The previous editions grew out of graduate level courses in mathematics, engineering, and physics given at several different universities. The courses took students who had some background in differential equations and lead them through a systematic grounding in the theory of Hamiltonian mechanics from a dynamical systems point of view. This text provides a mathematical structure of celestial mechanics ideal for beginners, and will be useful to graduate students and researchers alike. Reviews of the second edition: "The primary subject here is the basic theory of Hamiltonian differential equations studied from the perspective of differential dynamical systems. The N-body problem is used as the primary example of a Hamiltonian system, a touchstone for the theory as the authors develop it. This book is intended to support a first course at the graduate level for mathematics and engineering students. ... It is a well-organized and accessible introduction to the subject ... . This is an attractive book ... ." (William J. Satzer, The Mathematical Association of America, March, 2009) "The second edition of this text infuses new mathematical substance and relevance into an already modern classic ... and is sure to excite future generations of readers. ... This outstanding book can be used not only as an introductory course at the graduate level in mathematics, but also as course material for engineering graduate students. ... it is an elegant and invaluable reference for mathematicians and scientists with an interest in classical and celestial mechanics, astrodynamics, physics, biology, and related fields." (Marian Gidea, Mathematical Reviews, Issue 2010 d)

THE THREE-BODY PROBLEM AND THE EQUATIONS OF DYNAMICS

POINCARÉ'S FOUNDATIONAL WORK ON DYNAMICAL SYSTEMS THEORY

Springer Here is an accurate and readable translation of a seminal article by Henri Poincaré that is a classic in the study of dynamical systems popularly called chaos theory. In an effort to understand the stability of orbits in the solar system, Poincaré applied a Hamiltonian formulation to the equations of planetary motion and studied these differential equations in the limited case of three bodies to arrive at properties of the equations' solutions, such as orbital resonances and horseshoe orbits. Poincaré wrote for professional mathematicians and astronomers interested in celestial mechanics and differential equations. Contemporary historians of math or science and researchers in dynamical systems and planetary motion with an interest in the origin or history of their field will find his work fascinating.

ORBITAL AND CELESTIAL MECHANICS

AIAA

THE ATHENAEUM

JOURNAL OF LITERATURE, SCIENCE, THE FINE ARTS, MUSIC AND THE DRAMA

PREDICTABILITY, STABILITY, AND CHAOS IN N-BODY DYNAMICAL SYSTEMS

Springer Science & Business Media The reader will find in this volume the Proceedings of the NATO Advanced Study Institute held in Cortina d'Ampezzo, Italy between August 6 and August 17, 1990 under the title "Predictability, Stability, and Chaos in N-Body Dynamical Systems". The Institute was the latest in a series held at three-yearly inter vals from 1972 to 1987 in dynamical astronomy, theoretical mechanics and celestial mechanics. These previous institutes, held in high esteem by the international community of research workers, have resulted in a series of well-received Proceedings. The 1990 Institute attracted 74 participants from 16 countries, six outside the NATO group. Fifteen series of lectures were given by invited speakers; additionally some 40 valuable presentations were made by the younger participants, most of which are included in these Proceedings. The last twenty years in particular has been a time of increasingly rapid progress in tackling long-standing and also newly-arising problems in dynamics of N-body systems, point-mass and non-point-mass, a rate of progress achieved because of correspondingly rapid developments of new computer hardware and software together with the advent of new analytical techniques. It was a time of exciting progress culminating in the ability to carry out research programmes into the evolution of the outer Solar 8 System over periods of more than 10 years and to study star cluster and galactic models in unprecedented detail.

PHYSICS BRIEFS

PHYSIKALISCHE BERICHTE

NEW METHODS OF CELESTIAL MECHANICS

NEWTON'S CLOCK

CHAOS IN THE SOLAR SYSTEM

Henry Holt and Company With his critically acclaimed best-sellers The Mathematical Tourist and Islands of Truth, Ivars Peterson took readers to the frontiers of modern mathematics. His new book provides an up-to-date look at one of science's greatest detective stories: the search for order in the workings of the solar system. In the late 1600s, Sir Isaac Newton provided what astronomers had long sought: a seemingly reliable way of calculating planetary orbits and positions. Newton's laws of motion and his coherent, mathematical view of the universe dominated scientific discourse for centuries. At the same time, observers recorded subtle, unexpected movements of the planets and other bodies, suggesting that the solar system is not as placid and predictable as its venerable clockwork image suggests. Today, scientists can go beyond the hand calculations, mathematical tables, and massive observational logs that limited the explorations of Newton, Copernicus, Galileo, Kepler, Tycho Brahe, and others. Using supercomputers to simulate the dynamics of the solar system, modern astronomers are learning more about the motions they observe and uncovering some astonishing examples of chaotic behavior in the heavens. Nonetheless, the long-term stability of the solar system remains a perplexing, unsolved issue, with each step toward its resolution exposing additional uncertainties and deeper mysteries. To show how our view of the solar system has changed from clocklike precision to chaos and complexity, Newton's Clock describes the development of celestial mechanics through the ages--from the star charts of ancient navigators to the seminal discoveries of the 17th centure; from the crucial work of Poincaré to the startling, sometimes controversial findings and theories made possible by modern mathematics and computer simulations. The result makes for entertaining and provocative reading, equal parts science, history, and intellectual adventure.

ARNOLD DIFFUSION FOR SMOOTH SYSTEMS OF TWO AND A HALF DEGREES OF FREEDOM

(AMS-208)

Princeton University Press The first complete proof of Arnold diffusion—one of the most important problems in dynamical systems and mathematical physics Arnold diffusion, which concerns the appearance of chaos in classical mechanics, is one of the most important problems in the fields of dynamical systems and mathematical physics. Since it was discovered by Vladimir Arnold in 1963, it has attracted the efforts of some of the most prominent researchers in mathematics. The question is whether a typical perturbation of a particular system will result in chaotic or unstable dynamical phenomena. In this groundbreaking book, Vadim Kaloshin and Ke Zhang provide the first complete proof of Arnold diffusion, demonstrating that that there is topological instability for typical perturbations of five-dimensional integrable systems (two and a half degrees of freedom). This proof realizes a plan John Mather announced in 2003 but was unable to complete before his death. Kaloshin and Zhang follow Mather's strategy but emphasize a more Hamiltonian approach, tying together normal forms theory, hyperbolic theory, Mather theory, and weak KAM theory. Offering a complete, clean, and modern explanation of the steps involved in the proof, and a clear account of background material, this book is designed to be accessible to students as well as researchers. The result is a critical contribution to mathematical physics and dynamical systems, especially Hamiltonian systems.

MATHEMATICS OF COMPLEXITY AND DYNAMICAL SYSTEMS

Springer Science & Business Media Mathematics of Complexity and Dynamical Systems is an authoritative reference to the basic tools and concepts of complexity, systems theory, and dynamical systems from the perspective of pure and applied mathematics. Complex systems are systems that comprise many interacting parts with the ability to generate a new quality of collective behavior through self-organization, e.g. the spontaneous formation of temporal, spatial or functional structures. These systems are often characterized by extreme sensitivity to initial conditions as well as emergent behavior that are not readily predictable or even completely deterministic. The more than 100 entries in this wide-ranging, single source work provide a comprehensive explication of the theory and applications of mathematical complexity, covering ergodic theory, fractals and multifractals, dynamical systems, perturbation theory, solitons, systems and control theory, and related topics. Mathematics of Complexity and Dynamical Systems is an essential reference for all those interested in mathematical complexity, from undergraduate and graduate students up through professional researchers.

LATIN AS THE LANGUAGE OF SCIENCE AND LEARNING

Walter de Gruyter GmbH & Co KG This book investigates the role of the Latin language as a vehicle for science and learning from several angles. First, the question what was understood as 'science' through time and how it is named in different languages, especially the Classical ones, is approached. Criteria for what did pass as scientific are found that point to 'science' as a kind of Greek Denkstil based on pattern-finding and their unbiased checking. In a second part, a brief diachronic panorama introduces schools of thought and authors who wrote in Latin from antiquity to the present. Latin's heydays in this function are clearly the time between the twelfth and eighteenth centuries. Some niches where it was used longer are examined and reasons sought why Latin finally lost this lead-role. A third part seeks to define the peculiar characteristics of scientific Latin using corpus linguistic approaches. As a result, several types of scientific writing can be identified. The question of how to transfer science from one linguistic medium to another is never far: Latin inherited this role from Greek and is in turn the ancestor of science done in the modern vernaculars. At the end of the study, the importance of Latin science for modern science in English becomes evident.

SOLAR SYSTEM DYNAMICS

Cambridge University Press The Solar System is a complex and fascinating dynamical system. This is the first textbook to describe comprehensively the dynamical features of the Solar System and to provide students with all the mathematical tools and physical models they need to understand how it works. It is a benchmark publication in the field of planetary dynamics and destined to become a classic. Clearly written and well illustrated, Solar System Dynamics shows how a basic knowledge of the two- and three-body problems and perturbation theory can be combined to understand features as diverse as the tidal heating of Jupiter's moon Io, the origin of the Kirkwood gaps in the asteroid belt, and the radial structure of Saturn's rings. Problems at the end of each chapter and a free Internet

Mathematica® software package are provided. Solar System Dynamics provides an authoritative textbook for courses on planetary dynamics and celestial mechanics. It also equips students with the mathematical tools to tackle broader courses on dynamics, dynamical systems, applications of chaos theory and non-linear dynamics.

PARABLES FOR THE VIRTUAL

MOVEMENT, AFFECT, SENSATION

Duke University Press Since its publication twenty years ago, Brian Massumi's pioneering Parables for the Virtual has become an essential text for interdisciplinary scholars across the humanities. Massumi views the body and media such as television, film, and the internet as cultural formations that operate on multiple registers of sensation. Renewing and assessing William James's radical empiricism and Henri Bergson's philosophy of perception through the filter of the postwar French philosophy of Deleuze, Guattari, and Foucault, Massumi links a cultural logic of variation to questions of movement, affect, and sensation. Replacing the traditional opposition of literal and figural with distinctions between stasis and motion and between actual and virtual, Massumi tackles related theoretical issues by applying them to cultural mediums as diverse as architecture, body art, the digital art of Stelarc, and Ronald Reagan's acting career. The result is an intriguing combination of cultural theory, science, and philosophy that asserts itself in a crystalline and multifaceted argument. This twentieth anniversary edition includes a new preface in which Massumi situates the book in relation to developments since its publication and outlines the evolution of its main concepts. It also includes two short texts, "Keywords for Affect" and "Missed Conceptions about Affect," in which Massumi explicates his approach to affect in ways that emphasize the book's political and philosophical stakes.

TURBULENCE

THE LEGACY OF A. N. KOLMOGOROV

Cambridge University Press This textbook presents a modern account of turbulence, one of the greatest challenges in physics. The state-of-the-art is put into historical perspective five centuries after the first studies of Leonardo and half a century after the first attempt by A.N. Kolmogorov to predict the properties of flow at very high Reynolds numbers. Such "fully developed turbulence" is ubiquitous in both cosmical and natural environments, in engineering applications and in everyday life. First, a qualitative introduction is given to bring out the need for a probabilistic description of what is in essence a deterministic system. Kolmogorov's 1941 theory is presented in a novel fashion with emphasis on symmetries (including scaling transformations) which are broken by the mechanisms producing the turbulence and restored by the chaotic character of the cascade to small scales. Considerable material is devoted to intermittency, the clumpiness of small-scale activity, which has led to the development of fractal and multifractal models. Such models, pioneered by B. Mandelbrot, have applications in numerous fields besides turbulence (diffusion limited aggregation, solid-earth geophysics, attractors of dynamical systems, etc). The final chapter contains an introduction to analytic theories of the sort pioneered by R. Kraichnan, to the modern theory of eddy transport and renormalization and to recent developments in the statistical theory of two-dimensional turbulence. The book concludes with a guide to further reading. The intended readership for the book ranges from first-year graduate students in mathematics, physics, astrophysics, geosciences and engineering, to professional scientists and engineers.

MATHEMATICAL ASPECTS OF CLASSICAL AND CELESTIAL MECHANICS

Springer Science & Business Media The main purpose of the book is to acquaint mathematicians, physicists and engineers with classical mechanics as a whole, in both its traditional and its contemporary aspects. As such, it describes the fundamental principles, problems, and methods of classical mechanics, with the emphasis firmly laid on the working apparatus, rather than the physical foundations or applications. Chapters cover the n-body problem, symmetry groups of mechanical systems and the corresponding conservation laws, the problem of the integrability of the equations of motion, the theory of oscillations and perturbation theory.

FOUNDATIONS OF COMPLEX-SYSTEM THEORIES

IN ECONOMICS, EVOLUTIONARY BIOLOGY, AND STATISTICAL PHYSICS

Cambridge University Press Analyzes approaches to the study of complexity in the physical, biological, and social sciences.

STRUCTURE AND INTERPRETATION OF CLASSICAL MECHANICS, SECOND EDITION

MIT Press The new edition of a classic text that concentrates on developing general methods for studying the behavior of classical systems, with extensive use of computation. We now know that there is much more to classical mechanics than previously suspected. Derivations of the equations of motion, the focus of traditional presentations of mechanics, are just the beginning. This innovative textbook, now in its second edition, concentrates on developing general methods for studying the behavior of classical systems, whether or not they have a symbolic solution. It focuses on the phenomenon of motion and makes extensive use of computer simulation in its explorations of the topic. It weaves recent discoveries in nonlinear dynamics throughout the text, rather than presenting them as an afterthought. Explorations of phenomena such as the transition to chaos, nonlinear resonances, and resonance overlap to help the student develop appropriate analytic tools for understanding. The book uses computation to constrain notation, to capture and formalize methods, and for simulation and symbolic analysis. The requirement that the computer be able to interpret any expression provides the student with strict and immediate feedback about whether an expression is correctly formulated. This second edition has been updated throughout, with revisions that reflect insights gained by the authors from using the text every year at MIT. In addition, because of substantial software improvements, this edition provides algebraic proofs of more generality than those in the previous edition; this improvement permeates the new edition.

SUN AND PLANETARY SYSTEM

PROCEEDINGS OF THE SIXTH EUROPEAN REGIONAL MEETING IN ASTRONOMY, HELD IN DUBROVNIK, YUGOSLAVIA, 19–23 OCTOBER 1981

Springer Science & Business Media Proceedings of the Sixth European Regional Meeting in Astronomy, held in Dubrovnik, Yugoslavia, October 19-23, 1981

ISLAM AND THE TRAJECTORY OF GLOBALIZATION

RATIONAL IDEALISM AND THE STRUCTURE OF WORLD HISTORY

Routledge The book examines the growing tension between social movements that embrace egalitarian and inclusivist views of national and global politics, most notably classical liberalism, and those that advance social hierarchy and national exclusivism, such as neoliberalism, neoconservatism, and national populism. In exploring issues relating to tensions and conflicts around globalization, the book identifies historical patterns of convergence and divergence rooted in the monotheistic traditions, beginning with the ancient Israelites that dominated the Near East during the Axial age, through Islamic civilization, and finally by considering the idealism-realism tensions in modern times. One thing remained constant throughout the various historical stages that preceded our current moment of global convergence: a recurring tension between transcendental idealism and various forms of realism. Transcendental idealism, which prioritize egalitarian and universal values, pushed periodically against the forces of realism that privilege established law and power structure. Equipped with the idealism-realism framework, the book examines the consequences of European realism that justified the imperialistic venture into Africa, the Middle East, and Latin America in the name of liberation and liberalization. The ill-conceived strategy has, ironically, engendered the very dysfunctional societies that produce the waves of immigrants in constant motion from the South to the North, simultaneously as it fostered the social hierarchy that transfer external tensions into identity politics within the countries of the North. The book focuses particularly on the role played historically by Islamic rationalism in translating the monotheistic egalitarian outlook into the institutions of religious pluralism, legislative and legal autonomy, and scientific enterprise

at the foundation of modern society. It concludes by shedding light on the significance of the Muslim presence in Western cultures as humanity draws slowly but consistently towards what we may come to recognize as the Global Age. The Open Access version of this book, available at http://www.taylorfrancis.com/books/e/9781003203360, has been made available under a Creative Commons Attribution-Non Commercial-No Derivatives 4.0 license.

RIGID BODY DYNAMICS

Walter de Gruyter GmbH & Co KG This book provides an up-to-date overview of results in rigid body dynamics, including material concerned with the analysis of nonintegrability and chaotic behavior in various related problems. The wealth of topics covered makes it a practical reference for researchers and graduate students in mathematics, physics and mechanics. Contents Rigid Body Equations of Motion and Their Integration The Euler – Poisson Equations and Their Generalizations The Kirchhoff Equations and Related Problems of Rigid Body Dynamics Linear Integrals and Reduction Generalizations of Integrability Cases. Explicit Integration Periodic Solutions, Nonintegrability, and Transition to Chaos Appendix A : Derivation of the Kirchhoff, Poincaré – Zhukovskii, and Four-Dimensional Top Equations Appendix B: The Lie Algebra e(4) and Its Orbits Appendix C: Quaternion Equations and L-A Pair for the Generalized Goryachev – Chaplygin Top Appendix D: The Hess Case and Quantization of the Rotation Number Appendix E: Ferromagnetic Dynamics in a Magnetic Field Appendix F: The Landau – Lifshitz Equation, Discrete Systems, and the Neumann Problem Appendix G: Dynamics of Tops and Material Points on Spheres and Ellipsoids Appendix H: On the Motion of a Heavy Rigid Body in an Ideal Fluid with Circulation Appendix I: The Hamiltonian Dynamics of Self-gravitating Fluid and Gas Ellipsoids

ESO'S EARLY HISTORY

THE EUROPEAN SOUTHERN OBSERVATORY FROM CONCEPT TO REALITY

DICTIONARY OF MINOR PLANET NAMES

ADDENDUM TO FIFTH EDITION: 2006 - 2008

Springer Science & Business Media The history and rapid development of minor planet dis In addition to citing the bibliographic source of the nam coveries constitute a fascinating story and one with a ing, we also provide the source of numbering. A spe rather breathtaking evolution. By October 2005, the cial concordance list will enable the evaluation of the total of numbered planets exceeded the remarkable cor respective publication dates. The complete work is, nerstone of 100,000 objects and only three years later of course, a thoroughly revised and considerably en in November 2008 we are even faced with minor planet larged data collection and every e?ort has been made ( ) 200000 . This dramatic evolution must be compared to check and correct each single piece of information ( ) with the huge time span of two centuries 1801–2000 again. For even more detailed information on the dis that was necessary to detect and to re?ne the orbits of covery circumstances of numbered but unnamed plan only the ?rst 20,000 minor planets. Nowadays, we need ets, the reader is referred to the extensive data ?les even less than 13 months for the same quantity! At the compiled by the Minor Planet Center. end of 2005, we had achieved a total of 12,804 named (According to a resolution of IAU Division III 2000, minor planets a fraction of less than 11 per cent of) Manchester IAU General Assembly DMPN attained all numbered minor planets.

A HISTORY OF ASTRONOMY

Courier Corporation Well-balanced, carefully reasoned study covers such topics as Ptolemaic theory, work of Copernicus, Kepler, Newton, Eddington's work on stars, much more. Illustrated. References.

ASTRONOMY AND ASTROPHYSICS MONTHLY INDEX

MODERN CELESTIAL MECHANICS

DYNAMICS IN THE SOLAR SYSTEM

CRC Press In the last 20 years, researchers in the field of celestial mechanics have achieved spectacular results in their effort to understand the structure and evolution of our solar system. Modern Celestial Mechanics uses a solid theoretical basis to describe recent results on solar system dynamics, and it emphasizes the dynamics of planets and of small bodies. To grasp celestial mechanics, one must comprehend the fundamental concepts of Hamiltonian systems theory, so this volume begins with an explanation of those concepts. Celestial mechanics itself is then considered, including the secular motion of planets and small bodies and mean motion resonances. Graduate students and researchers of astronomy and astrophysics will find Modern Celestial Mechanics an essential addition to their bookshelves.

FROM BEING TO BECOMING

TIME AND COMPLEXITY IN THE PHYSICAL SCIENCES

W.H. Freeman