Nonlinear Oscillations Dynamical Systems And Bifurcations

Dynamical Systems and ChaosDifferential Equations, Dynamical Systems, and Linear AlgebraDynamical System and ChaosDynamical SystemsAn Introduction to Dynamical Systems and ChaosDynamical Systems and Numerical AnalysisIntroduction to Applied Nonlinear Dynamical Systems and ChaosDynamical Systems with Applications using MATLAB®An Introduction to Dynamical SystemsRegularity and Complexity in Dynamical SystemsDiscrete Dynamical SystemsDynamical SystemsChaos and Dynamical SystemsDynamics ReportedDynamical Systems: ModellingEvolution Semigroups in Dynamical Systems and Differential EquationsDynamical Systems and Environmental ModelsAn Introduction To Chaotic Dynamical Systems, Second EditionDynamical Systems and ControlDynamical Systems and Geometric Mechanics Henk Broer Morris W. Hirsch Rui Dil? o Zeraoulia Elhadj G.C. Layek A. M. Stuart Stephen Wiggins Stephen Lynch D. K. Arrowsmith Albert C. J. Luo James T. Sandefur Werner Krabs David P. Feldman Jan Awrejcewicz Carmen Chicone Hans G? nter Bothe Robert Devaney Firdaus E. Udwadia Jared Maruskin

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Models An Introduction To Chaotic Dynamical Systems, Second Edition Dynamical Systems and Control Dynamical Systems and Geometric Mechanics *Henk Broer Morris W. Hirsch Rui Dil? oZeraoulia Elhadj G.C. Layek A. M. Stuart Stephen Wiggins Stephen Lynch D. K. Arrowsmith Albert C. J. Luo James T. Sandefur Werner Krabs David P. Feldman Jan Awrejcewicz Carmen Chicone Hans G? nter BotheRobert Devaney Firdaus E. Udwadia Jared Maruskin*

over the last four decades there has been extensive development in the theory of dynamical systems this book aims at a wide audience where the first four chapters have been used for an undergraduate course in dynamical systems material from the last two chapters and from the appendices has been used quite a lot for master and phd courses all chapters are concluded by an exercise section the book is also directed towards researchers where one of the challenges is to help applied researchers acquire background for a better understanding of the data that computer simulation or experiment may provide them with the development of the theory

this book is about dynamical aspects of ordinary differential equations and the relations between dynamical systems and certain fields outside pure mathematics a prominent role is played by the structure theory of linear operators on finite dimensional vector spaces the authors have included a self contained treatment of that subject

this textbook introduces the language and the techniques of the theory of dynamical systems of finite dimension for an audience of physicists engineers and mathematicians at the beginning of graduation author addresses geometric measure and computational aspects of the theory of dynamical systems some freedom is used in the more formal aspects using only proofs when there is an algorithmic advantage or because a result is simple and powerful the first part is an introductory course on dynamical systems theory it can be taught at the master s level during one semester not requiring specialized mathematical training in the second part the author describes some

applications of the theory of dynamical systems topics often appear in modern dynamical systems and complexity theories such as singular perturbation theory delayed equations cellular automata fractal sets maps of the complex plane and stochastic iterations of function systems are briefly explored for advanced students the author also explores applications in mechanics electromagnetism celestial mechanics nonlinear control theory and macroeconomy a set of problems consolidating the knowledge of the different subjects including more elaborated exercises are provided for all chapters

chaos is the idea that a system will produce very different long term behaviors when the initial conditions are perturbed only slightly chaos is used for novel time or energy critical interdisciplinary applications examples include high performance circuits and devices liquid mixing chemical reactions biological systems crisis management secure information processing and critical decision making in politics economics as well as military applications etc this book presents the latest investigations in the theory of chaotic systems and their dynamics the book covers some theoretical aspects of the subject arising in the study of both discrete and continuous time chaotic dynamical systems this book presents the state of the art of the more advanced studies of chaotic dynamical systems

the book discusses continuous and discrete systems in systematic and sequential approaches for all aspects of nonlinear dynamics the unique feature of the book is its mathematical theories on flow bifurcations oscillatory solutions symmetry analysis of nonlinear systems and chaos theory the logically structured content and sequential orientation provide readers with a global overview of the topic a systematic mathematical approach has been adopted and a number of examples worked out in detail and exercises have been included chapters 1 8 are devoted to continuous systems beginning with one dimensional flows symmetry is an inherent character of nonlinear systems and the lie invariance principle and its algorithm for finding symmetries of a system are discussed in chap 8 chapters 9 13 focus on discrete systems chaos and

FRACTALS CONJUGACY RELATIONSHIP AMONG MAPS AND ITS PROPERTIES ARE DESCRIBED WITH PROOFS CHAOS THEORY AND ITS CONNECTION WITH FRACTALS HAMILTONIAN FLOWS AND SYMMETRIES OF NONLINEAR SYSTEMS ARE AMONG THE MAIN FOCUSES OF THIS BOOK OVER THE PAST FEW DECADES THERE HAS BEEN AN UNPRECEDENTED INTEREST AND ADVANCES IN NONLINEAR SYSTEMS CHAOS THEORY AND FRACTALS WHICH IS REFLECTED IN UNDERGRADUATE AND POSTGRADUATE CURRICULA AROUND THE WORLD THE BOOK IS USEFUL FOR COURSES IN DYNAMICAL SYSTEMS AND CHAOS NONLINEAR DYNAMICS ETC FOR ADVANCED UNDERGRADUATE AND POSTGRADUATE STUDENTS IN MATHEMATICS PHYSICS AND ENGINEERING

THE FIRST THREE CHAPTERS CONTAIN THE ELEMENTS OF THE THEORY OF DYNAMICAL SYSTEMS AND THE NUMERICAL SOLUTION OF INITIAL VALUE PROBLEMS IN THE REMAINING CHAPTERS NUMERICAL METHODS ARE FORMULATED AS DYNAMICAL SYSTEMS AND THE CONVERGENCE AND STABILITY PROPERTIES OF THE METHODS ARE EXAMINED

MATHEMATICS IS PLAYING AN EVER MORE IMPORTANT ROLE IN THE PHYSICAL AND BIOLOGICAL SCIENCES PROVOKING A BLURRING OF BOUNDARIES BETWEEN SCIENTIFIC DISCIPLINES AND A RESURGENCE OF INTEREST IN THE MODERN AS WELL AS THE CLASSICAL TECHNIQUES OF APPLIED MATHEMATICS THIS RENEWAL OF INTEREST BOTH IN SEARCH AND TEACHING HAS LED TO THE ESTABLISHMENT OF THE SERIES TEXTS IN APPLIED MATHEMATICS TAM THE DEVELOPMENT OF NEW COURSES IS A NATURAL CONSEQUENCE OF A HIGH LEVEL OF EXCITEMENT ON THE RESEARCH FRONTIER AS NEWER TECHNIQUES SUCH AS NUME CAL AND SYMBOLIC COMPUTER SYSTEMS DYNAMICAL SYSTEMS AND CHAOS MIX WITH AND REINFORCE THE TRADITIONAL METHODS OF APPLIED MATHEMATICS THUS THE PURPOSE OF THIS TEXTBOOK SERIES IS TO MEET THE CURRENT AND FUTURE NEEDS OF THESE ADVANCES AND TO ENCOURAGE THE TEACHING OF NEW COURSES TAM WILL PUBLISH TEXTBOOKS SUITABLE FOR USE IN ADVANCED UNDERGRADUATE AND BEGINNING GRADUATE COURSES AND WILL COMPLEMENT THE APPLIED MAT MATICAL SCIENCES AMS SERIES WHICHWILL FOCUS ON ADVANCED TEXTBOOKS AND RESEARCH LEVEL MONOGRAPHS PASADENA CALIFORNIA J E MARSDEN PROVIDENCE RHODE ISLAND L SIROVICH COLLEGE PARK MARYLAND S S ANTMAN PREFACE TO THE SECOND EDITION THIS EDITION CONTAINS A SIGNI CANT AMOUNT OF NEW MATERIAL THE MAIN R SON FOR THIS IS

THAT THE SUBJECT OF APPLIED DYNAMICAL SYSTEMS THEORY HAS SEEN EXPLOSIVE GROWTH AND EXPANSION THROUGHOUT THE 1990S CONSEQUENTLY A STUDENT NEEDS A MUCH LARGER TOOLBOX TODAY IN ORDER TO BEGIN RESEARCH ON SIGNI CANT PROBLEMS

THIS INTRODUCTION TO DYNAMICAL SYSTEMS THEORY GUIDES READERS THROUGH THEORY VIA EXAMPLE AND THE GRAPHICAL MATLAB INTERFACE THE SIMULINK ACCESSORY IS USED TO SIMULATE REAL WORLD DYNAMICAL PROCESSES EXAMPLES INCLUDED ARE FROM MECHANICS ELECTRICAL CIRCUITS ECONOMICS POPULATION DYNAMICS EPIDEMIOLOGY NONLINEAR OPTICS MATERIALS SCIENCE AND NEURAL NETWORKS THE BOOK CONTAINS OVER 330 ILLUSTRATIONS 300 EXAMPLES AND EXERCISES WITH SOLUTIONS

IN RECENT YEARS THERE HAS BEEN AN EXPLOSION OF RESEARCH CENTRED ON THE APPEARANCE OF SO CALLED CHAOTIC BEHAVIOUR THIS BOOK PROVIDES A LARGELY SELF CONTAINED INTRODUCTION TO THE MATHEMATICAL STRUCTURES UNDERLYING MODELS OF SYSTEMS WHOSE STATE CHANGES WITH TIME AND WHICH THEREFORE MAY EXHIBIT THIS SORT OF BEHAVIOUR THE EARLY PART OF THIS BOOK IS BASED ON LECTURES GIVEN AT THE UNIVERSITY OF LONDON AND COVERS THE BACKGROUND TO DYNAMICAL SYSTEMS THE FUNDAMENTAL PROPERTIES OF SUCH SYSTEMS THE LOCAL BIFURCATION THEORY OF FLOWS AND DIFFEOMORPHISMS ANOSOV AUTOMORPHISM THE HORSESHOE DIFFEOMORPHISM AND THE LOGISTIC MAP AND AREA PRESERVING PLANAR MAPS THE AUTHORS THEN GO ON TO CONSIDER CURRENT RESEARCH IN THIS FIELD SUCH AS THE PERTURBATION OF AREA PRESERVING MAPS OF THE PLANE AND THE CYLINDER THIS BOOK WHICH HAS A GREAT NUMBER OF WORKED EXAMPLES AND EXERCISES MANY WITH HINTS AND OVER 200 FIGURES WILL BE A VALUABLE FIRST TEXTBOOK TO BOTH SENIOR UNDERGRADUATES AND POSTGRADUATE STUDENTS IN MATHEMATICS PHYSICS ENGINEERING AND OTHER AREAS IN WHICH THE NOTIONS OF QUALITATIVE DYNAMICS ARE EMPLOYED

REGULARITY AND COMPLEXITY IN DYNAMICAL SYSTEMS DESCRIBES PERIODIC AND CHAOTIC BEHAVIORS IN DYNAMICAL SYSTEMS INCLUDING CONTINUOUS DISCRETE IMPULSIVE DISCONTINUOUS AND SWITCHING SYSTEMS IN TRADITIONAL ANALYSIS THE PERIODIC AND CHAOTIC BEHAVIORS IN CONTINUOUS NONLINEAR DYNAMICAL SYSTEMS WERE EXTENSIVELY DISCUSSED EVEN IF UNSOLVED IN RECENT YEARS THERE HAS BEEN AN INCREASING AMOUNT OF INTEREST IN PERIODIC AND CHAOTIC BEHAVIORS IN

DISCONTINUOUS DYNAMICAL SYSTEMS BECAUSE SUCH DYNAMICAL SYSTEMS ARE PREVALENT IN ENGINEERING USUALLY THE SMOOTHENING OF DISCONTINUOUS DYNAMICAL SYSTEM IS ADOPTED IN ORDER TO USE THE THEORY OF CONTINUOUS DYNAMICAL SYSTEMS HOWEVER SUCH TECHNIQUE CANNOT PROVIDE SUITABLE RESULTS IN SUCH DISCONTINUOUS SYSTEMS IN THIS BOOK AN ALTERNATIVE WAY IS PRESENTED TO DISCUSS THE PERIODIC AND CHAOTIC BEHAVIORS IN DISCONTINUOUS DYNAMICAL SYSTEMS

THIS TEXTBOOK IS AN ELEMENTARY INTRODUCTION TO THE WORLD OF DYNAMICAL SYSTEMS AND CHAOS DYNAMICAL SYSTEMS PROVIDE A MATHEMATICAL MEANS OF MODELING AND ANALYSING ASPECTS OF THE CHANGING WORLD AROUND US THE AIM OF THIS GROUND BREAKING NEW TEXT IS TO INTRODUCE THE READER BOTH TO THE WIDE VARIETY OF TECHNIQUES USED TO STUDY DYNAMICAL SYSTEMS AND TO THEIR MANY APPLICATIONS IN PARTICULAR INVESTIGATION OF DYNAMICAL SYSTEMS LEADS TO THE IMPORTANT CONCEPTS OF STABILITY STRANGE ATTRACTORS CHAOS AND FRACTALS

AT THE END OF THE NINETEENTH CENTURY LYAPUNOV AND POINCAR DEVELOPED THE SO CALLED QUALITATIVE THEORY OF DIFFERENTIAL EQUATIONS AND INTRODUCED GEOMETRIC TOPOLOGICAL CONSIDERATIONS WHICH HAVE LED TO THE CONCEPT OF DYNAMICAL SYSTEMS IN ITS PRESENT ABSTRACT FORM THIS CONCEPT GOES BACK TO G D BIRKHOFF THIS IS ALSO THE STARTING POINT OF CHAPTER 1 OF THIS BOOK IN WHICH UNCONTROLLED AND CONTROLLED TIME CONTINUOUS AND TIME DISCRETE SYSTEMS ARE INVESTIGATED CONTROLLED DYNAMICAL SYSTEMS COULD BE CONSIDERED AS DYNAMICAL SYSTEMS IN THE STRONG SENSE IF THE CONTROLS WERE INCORPORATED INTO THE STATE SPACE WE HOWEVER ADAPT THE CONVENTIONAL TREATMENT OF CONTROLLED SYSTEMS AS IN CONTROL THEORY WE ARE MAINLY INTERESTED IN THE QUESTION OF CONTROLLABILITY OF DYNAMICAL SYSTEMS INTO EQUILIBRIUM STATES IN THE NON AUTONOMOUS TIME DISCRETE CASE WE ALSO CONSIDER THE PROBLEM OF STABILIZATION WE CONCLUDE WITH CHAOTIC BEHAVIOR OF AUTONOMOUS TIME DISCRETE SYSTEMS AND ACTUAL REAL WORLD APPLICATIONS

CHAOS AND DYNAMICAL SYSTEMS PRESENTS AN ACCESSIBLE CLEAR INTRODUCTION TO DYNAMICAL SYSTEMS AND CHAOS THEORY IMPORTANT AND EXCITING AREAS THAT HAVE SHAPED MANY SCIENTIFIC

FIELDS WHILE THE RULES GOVERNING DYNAMICAL SYSTEMS ARE WELL SPECIFIED AND SIMPLE THE BEHAVIOR OF MANY DYNAMICAL SYSTEMS IS REMARKABLY COMPLEX OF PARTICULAR NOTE SIMPLE DETERMINISTIC DYNAMICAL SYSTEMS PRODUCE OUTPUT THAT APPEARS RANDOM AND FOR WHICH LONG TERM PREDICTION IS IMPOSSIBLE USING LITTLE MATH BEYOND BASIC ALGEBRA DAVID FELDMAN GIVES READERS A GROUNDED CONCRETE AND CONCISE OVERVIEW IN INITIAL CHAPTERS FELDMAN INTRODUCES ITERATED FUNCTIONS AND DIFFERENTIAL EQUATIONS HE THEN SURVEYS THE KEY CONCEPTS AND RESULTS TO EMERGE FROM DYNAMICAL SYSTEMS CHAOS AND THE BUTTERFLY EFFECT DETERMINISTIC RANDOMNESS BIFURCATIONS UNIVERSALITY PHASE SPACE AND STRANGE ATTRACTORS THROUGHOUT FELDMAN EXAMINES POSSIBLE SCIENTIFIC IMPLICATIONS OF THESE PHENOMENA FOR THE STUDY OF COMPLEX SYSTEMS HIGHLIGHTING THE RELATIONSHIPS BETWEEN SIMPLICITY AND COMPLEXITY ORDER AND DISORDER FILLING THE GAP BETWEEN POPULAR ACCOUNTS OF DYNAMICAL SYSTEMS AND CHAOS AND TEXTBOOKS AIMED AT PHYSICISTS AND MATHEMATICIANS CHAOS AND DYNAMICAL SYSTEMS WILL BE HIGHLY USEFUL NOT ONLY TO STUDENTS AT THE UNDERGRADUATE AND ADVANCED LEVELS BUT ALSO TO RESEARCHERS IN THE NATURAL SOCIAL AND BIOLOGICAL SCIENCES

DYNAMICS REPORTED REPORTS ON RECENT DEVELOPMENTS IN DYNAMICAL SYSTEMS DYNAMICAL SYSTEMS OF COURSE ORIGINATED FROM ORDINARY DIFFERENTIAL EQUATIONS TODAY DYNAMICAL SYSTEMS COVER A MUCH LARGER AREA INCLUDING DYNAMICAL PRO CESSES DESCRIBED BY FUNCTIONAL AND INTEGRAL EQUATIONS BY PARTIAL AND STOCHASTIC DIFFERENTIAL EQUATIONS ETC DYNAMICAL SYSTEMS HAVE INVOLVED REMARKABLY IN RECENT YEARS A WEALTH OF NEW PHENOMENA NEW IDEAS AND NEW TECHNIQUES ARE PROVING TO BE OF CONSIDERABLE INTEREST TO SCIENTISTS IN RATHER DIFFERENT FIELDS IT IS NOT SURPRISING THAT THOUSANDS OF PUBLICATIONS ON THE THEORY ITSELF AND ON ITS VARIOUS APPLICATIONS ARE APPEARING DYNAMICS REPORTED PRESENTS CAREFULLY WRITTEN ARTICLES ON MAJOR SUB JECTS IN DYNAMICAL SYSTEMS AND THEIR APPLICATIONS ADDRESSED NOT ONLY TO SPECIAL ISTS BUT ALSO TO A BROADER RANGE OF READERS INCLUDING GRADUATE STUDENTS TOPICS ARE ADVANCED WHILE DETAILED EXPOSITION OF IDEAS RESTRICTION TO TYPICAL RESULT RATHER THAN THE MOST GENERAL ONES AND LAST BUT NOT LEAST LUCID PROOFS HELP TO GAIN THE UTMOST DEGREE OF CLARITY IT IS HOPED THAT DYNAMICS REPORTED WILL BE USEFUL FOR THOSE ENTER ING THE FIELD AND WILL STIMULATE AN EXCHANGE OF IDEAS AMONG

THOSE WORKING IN DYNAMICAL SYSTEMS

THE BOOK IS A COLLECTION OF CONTRIBUTIONS DEVOTED TO ANALYTICAL NUMERICAL AND EXPERIMENTAL TECHNIQUES OF DYNAMICAL SYSTEMS PRESENTED AT THE INTERNATIONAL CONFERENCE DYNAMICAL SYSTEMS THEORY AND APPLICATIONS HELD IN □ □ D□ POLAND ON DECEMBER 7 10 2015 THE STUDIES GIVE DEEP INSIGHT INTO NEW PERSPECTIVES IN ANALYSIS SIMULATION AND OPTIMIZATION OF DYNAMICAL SYSTEMS EMPHASIZING DIRECTIONS FOR FUTURE RESEARCH BROADLY OUTLINED TOPICS COVERED INCLUDE BIFURCATION AND CHAOS IN DYNAMICAL SYSTEMS ASYMPTOTIC METHODS IN NONLINEAR DYNAMICS DYNAMICS IN LIFE SCIENCES AND BIOENGINEERING ORIGINAL NUMERICAL METHODS OF VIBRATION ANALYSIS CONTROL IN DYNAMICAL SYSTEMS STABILITY OF DYNAMICAL SYSTEMS VIBRATIONS OF LUMPED AND CONTINUOUS SYSTEMS NON SMOOTH SYSTEMS ENGINEERING SYSTEMS AND DIFFERENTIAL EQUATIONS MATHEMATICAL APPROACHES TO DYNAMICAL SYSTEMS AND MECHATRONICS

THE AUTHORS MATHEMATICIANS OF UNKNOWN AFFILIATIONS CHARACTERIZE ASYMPTOTIC PROPERTIES STABILITY HYPERBOLICITY EXPONENTIAL DICHOTOMY OF LINEAR DIFFERENTIAL EQUATIONS ON BANACH SPACES AND INFINITE DIMENSIONAL DYNAMICAL SYSTEMS IN TERMS OF SPECTRAL PROPERTIES OF A SPECIAL TYPE OF ASSOCIATED CONTINUOUS SEMIGROUPS OF LINEAR OPERATORS THE THEORY OF NONAUTONOMOUS ABSTRACT CAUCHY PROBLEMS ON BANACH SPACES THE THEORY OF C AND BANACH ALGEBRAS ERGODIC THEORY THE THEORY OF HYPERBOLIC DYNAMICAL SYSTEMS AND LYAPUNOV EXPONENTS APPLICATIONS ARE PROVIDED TO LINEAR CONTROL THEORY MAGNETOHYDRODYNAMICS AND THE THEORY OF TRANSFER OPERATORS ANNOTATION COPYRIGHTED BY BOOK NEWS INC PORTLAND OR

KEINE AUSF□ HRLICHE BESCHREIBUNG F□ R DYNAMICAL SYSTEMS AND ENVIRONMENTAL MODELS VERF□ GBAR

THE STUDY OF NONLINEAR DYNAMICAL SYSTEMS HAS EXPLODED IN THE PAST 25 YEARS AND ROBERT L DEVANEY HAS MADE THESE ADVANCED RESEARCH DEVELOPMENTS ACCESSIBLE TO UNDERGRADUATE AND GRADUATE MATHEMATICS STUDENTS AS WELL AS RESEARCHERS IN OTHER DISCIPLINES WITH THE INTRODUCTION OF THIS WIDELY PRAISED BOOK IN THIS SECOND EDITION OF HIS BEST SELLING TEXT DEVANEY INCLUDES NEW MATERIAL ON THE ORBIT DIAGRAM FRO MAPS OF THE INTERVAL AND THE

MANDELBROT SET AS WELL AS STRIKING COLOR PHOTOS ILLUSTRATING BOTH JULIA AND MANDELBROT SETS THIS BOOK ASSUMES NO PRIOR ACQUAINTANCE WITH ADVANCED MATHEMATICAL TOPICS SUCH AS MEASURE THEORY TOPOLOGY AND DIFFERENTIAL GEOMETRY ASSUMING ONLY A KNOWLEDGE OF CALCULUS DEVANEY INTRODUCES MANY OF THE BASIC CONCEPTS OF MODERN DYNAMICAL SYSTEMS THEORY AND LEADS THE READER TO THE POINT OF CURRENT RESEARCH IN SEVERAL AREAS THE FIRST TWO CHAPTERS INTRODUCE THE READER TO A BROAD SPECTRUM OF FUNDAMENTAL TOPICS IN DYNAMICS HYPERBOLICITY SYMBOLIC DYNAMICS STRUCTURAL STABILITY STABLE AND UNSTABLE MANIFOLDS AND BIFURCATION THEORY READERS FAMILIAR WITH LINEAR ALGEBRA AND COMPLEX ANALYSIS WILL BE LED TO THE BRINK OF CONTEMPORARY RESEARCH IN THE BOOK S CONCLUDING CHAPTER BUT FOR ANYONE WITH A BACKGROUND IN CALCULUS DEVANEY PROVIDES A COMPREHENSIVE EXPLORATION INTO THE MATHEMATICS OF CHAOS

THE 11TH INTERNATIONAL WORKSHOP ON DYNAMICS AND CONTROL BROUGHT TOGETHER SCIENTISTS AND ENGINEERS FROM DIVERSE FIELDS AND GAVE THEM A VENUE TO DEVELOP A GREATER UNDERSTANDING OF THIS DISCIPLINE AND HOW IT RELATES TO MANY AREAS IN SCIENCE ENGINEERING ECONOMICS AND BIOLOGY THE EVENT GAVE RESEARCHERS AN OPPORTUNITY TO INVESTIGATE IDEAS AND TECHNIQ

INTRODUCTION TO DYNAMICAL SYSTEMS AND GEOMETRIC MECHANICS PROVIDES A COMPREHENSIVE TOUR OF TWO FIELDS THAT ARE INTIMATELY ENTWINED DYNAMICAL SYSTEMS IS THE STUDY OF THE BEHAVIOR OF PHYSICAL SYSTEMS THAT MAY BE DESCRIBED BY A SET OF NONLINEAR FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS IN EUCLIDEAN SPACE WHEREAS GEOMETRIC MECHANICS EXPLORE SIMILAR SYSTEMS THAT INSTEAD EVOLVE ON DIFFERENTIABLE MANIFOLDS THE FIRST PART DISCUSSES THE LINEARIZATION AND STABILITY OF TRAJECTORIES AND FIXED POINTS INVARIANT MANIFOLD THEORY PERIODIC ORBITS POINCAR? MAPS FLOQUET THEORY THE POINCAR? BENDIXSON THEOREM BIFURCATIONS AND CHAOS THE SECOND PART OF THE BOOK BEGINS WITH A SELF CONTAINED CHAPTER ON DIFFERENTIAL GEOMETRY THAT INTRODUCES NOTIONS OF MANIFOLDS MAPPINGS VECTOR FIELDS THE JACOBI LIE BRACKET AND DIFFERENTIAL FORMS

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