

Handbook Of Solitons Research Technology And

Handbook of Solitons Focus on Soliton Research Advances in Solitons Research Solitons Optical Solitons Soliton Nature Massive WDM and TDM Soliton Transmission Systems New Developments in Soliton Research Signal Solitons Solitons Energy Research Abstracts Soliton Theory and Its Applications Current Research in Advanced Materials and Processes Advances in Soliton Research State/Industry/University Cooperative Research Centers Symposium Elements of Soliton Theory Graduate Study in Physics and Astronomy Topological and Non-Topological Solitons in Scalar Field Theories Statistical Physics and Chaos in Fusion Plasmas S. P. Lang L. V. Chen Alison Abbott Mohamed Atef Helal J. R. Taylor Sergei Eremenko Akira Hasegawa L. V. Chen R. MacKenzie Boling Guo Chaohao Gu Dragan P. Uskoković L. V. Chen George L. Lamb University of Iowa. Department of Physics and Astronomy Yakov M. Shnir C. W. Horton, Jr.

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in mathematics and physics a soliton is a self reinforcing solitary wave a wave packet or pulse that maintains its shape while it travels at constant speed solitons are caused by a cancellation of non linear and dispersive effects in the medium dispersive effects refer to dispersion relations between the frequency and the speed of the waves solitons arise as the solutions of a widespread class of weakly non linear dispersive partial differential equations describing physical systems this book presents the latest research in the field

since their discovery a mere thirty years ago solitons have been invoked to explain such diverse phenomena as the long lived giant red spot in the highly turbulent jovian atmosphere the famous fermi pasta ulam paradox wherein a nonlinearly coupled lattice of particles does not display the expected equipartition of energy among available modes ion acoustic waves in a plasma energy storage and transfer in proteins via the davydov soliton and the propagation of short laser pulses in optical fibres over long distances with negligible shape change this volume presents important research from around the globe

the term soliton was coined only in 1965 to reflect the particle like nature of solitary waves that remain intact even after mutual collisions the book includes the latest developments in the field including the main properties of erupting solids considering the case of optical fiber systems described by the complex ginzburg landau equation cgle the propagation of ultrashort solitons in fiber optic systems in the presence of intrapulse raman scattering the connection between rogue waves and modulation instability the properties of solitary waves in coupled electrical nonlinear transmission lines the results of experimental observations of solitary waves and their interactions the engineering applications based on the management of solitary waves on coupled ntlis and finally the effects of inhomogeneous exchange within ferromagnetic insulators

this newly updated volume of the encyclopedia of complexity and systems science ecss presents several mathematical models that describe this physical phenomenon including the famous non linear equation korteweg de vries kdv that represents the canonical form of solitons also there exists a class of nonlinear partial differential equations that led to solitons e.g. kadomtsev petviashvili kp klein gordon kg sine gordon sg non linear schrödinger nls korteweg de vries burger s kdvb etc different linear mathematical methods can be used to solve these models analytically such as the inverse scattering transformation ist adomian decomposition method variational iteration method vim homotopy analysis method ham and homotopy perturbation method hpm other non analytic methods use the computational techniques available in such popular mathematical packages as mathematica maple and matlab the main purpose of this volume is to provide physicists engineers and their students with the proper methods and tools to solve the soliton equations and to discover the new possibilities of using solitons in multi disciplinary areas ranging from telecommunications to biology cosmology and oceanographic studies

provides an overview of our current understanding of optical soliton properties introducing the subject for students and reviewing the most recent research

dedicated to a broad audience and scientists this new generation easy to read pictorial interactive book uses beautiful photography video channel and computer scripts in r and python to demonstrate existing and explore new solitons the magnificent and versatile energy concentration phenomenon of nature with 200 images and videos collected around the world and on magnificent australian beaches we describe captivating stand alone ocean solitons capable of travelling hundreds of miles uninterrupted along with scary tsunamis the tricky solitonic bores propagating upstream narrow river channels may cause disasters for coastal cities sudden killer rogue waves endanger even large ships powerful tornadoes surfing tubes whirlpools and rotating galaxies are solitonic vortices unique videos of breathers and soliton envelope waves with legendary ninth wave in the middle are commented by some legendary scientists beautiful photography of square grid waves confirms tendency of nature to produce multi dimensional formations solitonic dislocations and defects are widespread in metal shapes around us solitonic energy localization effects appear in swing movements of humans perfected them in many sports and dances we also explore new solitonic hypothesis and theories geosolitons may have played an important role in formation of mountain ranges and sedimentary rocks using solitonic functions for heart blood pressure pulses may lead to new generation devices solitonic dislocation and stability effects may exist in behaviour of correlated financial markets new class of atomic solitons can be used to describe higgs boson the god particle fields spacetime quanta and other fundamental building blocks of nature readers are welcomed to subscribe and provide own videos to our dedicated video channel and website solitonnature.com

this book summarizes the proceedings of the invited talks presented at the international symposium on massive tdm and wdm optical soliton transmission systems held in kyoto during november 9 12 1999 the symposium is the third of the series organized by research group for optical soliton communications rosc chaired by akira hasegawa the research group rosc was established in japan in april 1995 with a support of the japanese ministry of post and telecommunications to promote collaboration and information change among communication service companies communication industries and academic circles in the theory and application of optical solitons the symposium attracted enthusiastic response from worldwide researchers in the field of soliton based communications and intensive discussions were made in the symposium held in 1997 new concept of soliton transmission based on dispersion management of optical fibers were presented this new soliton is now called the dispersion managed soliton the present symposium mainly focuses the theoretical and experimental developments of dispersion managed solitons it is remarkable that the concept of the dispersion managed soliton which was just born two years ago when the naming was not even given yet has become the center of soliton research in two years the dispersion managed soliton has an enhanced power in maintaining reasonable signal to noise ratio yet has reduced gordon haus timing jitter by reduced averagedispersion the dispersion managed soliton also has demonstrated its power in soliton based wdm transmissions

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solitons were discovered by john scott russel in 1834 and have interested scientists and mathematicians ever since they have been the subject of a large body of research in a wide variety of fields of physics and mathematics not to mention engineering and other branches of science such as biology this volume comprises the written versions of the talks presented at a workshop held at queen s university in 1997 an interdisciplinary meeting wherein top researchers from many fields could meet interact and exchange ideas topics covered include mathematical and numerical aspects of solitons as well as applications of solitons to nuclear and particle physics cosmology and condensed matter physics the book should be of interest to researchers in any field in which solitons are encountered

this book provides an up to date overview of mathematical theories and research results on solitons presenting related mathematical methods and applications as well as numerical experiments different types of soliton equations are covered along with their dynamical behaviors and applications from physics making the book an essential reference for researchers and graduate students in applied mathematics and physics contents introduction inverse scattering transform asymptotic behavior to initial value problems for some integrable evolution nonlinear equations interaction of solitons and its asymptotic properties birota method b² cklund transformations and the infinitely many conservation laws multi dimensional solitons and their stability numerical computation methods for some nonlinear evolution equations the geometric theory of solitons global existence and blow up for the nonlinear evolution equations the soliton movements of elementary particles in nonlinear quantum field the theory of soliton movement of superconductive features the

soliton movements in condensed state systems contents

soliton theory is an important branch of applied mathematics and mathematical physics an active and productive field of research it has important applications in fluid mechanics nonlinear optics classical and quantum fields theories etc this book presents a broad view of soliton theory it gives an expository survey of the most basic ideas and methods such as physical background inverse scattering backlund transformations finite dimensional completely integrable systems symmetry kac moody algebra solitons and differential geometry numerical analysis for nonlinear waves and gravitational solitons besides the essential points of the theory several applications are sketched and some recent developments partly by the authors and their collaborators are presented

the present book comprises ninety two papers by leading scientists from 21 countries thematically arranged into ten sections i nanostructures and thin films ii solid state phenomena iii nanomaterials iv advanced materials v materials for electrochemistry vi spectroscopic characterization vii synthesis and processing viii powders ceramics and sintering ix composites and x biomaterials the book is recommended to all researchers and students working in this fascinating scientific and technological field as they cannot fail to find many fruitful and stimulating ideas in this rich vein of theoretical and experimental contributions

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an introduction to integrable and non integrable scalar field models with topological and non topological soliton solutions focusing on both topological and non topological solitons this book brings together discussion of solitary waves and construction of soliton solutions and provides a discussion of solitons using simple model examples

papers from twenty nine of the world s leading scientists investigate the statistical properties of nonlinear dynamical systems emphasizing their relation to the problem of plasma confinement a powerful new diagrammatic perturbation theory is presented for a first principles calculation of the clump kinetic equation and for the first time detailed calculations and experimental considerations describe the practical consequences of these correlations unique to this book is the collection of works on the problem of long lived correlations in phase space of the vlasov poisson system a new method of computing lyapunov exponents from experimental data and a method for calculating the splitting of periodic orbits in conservative systems are developed

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