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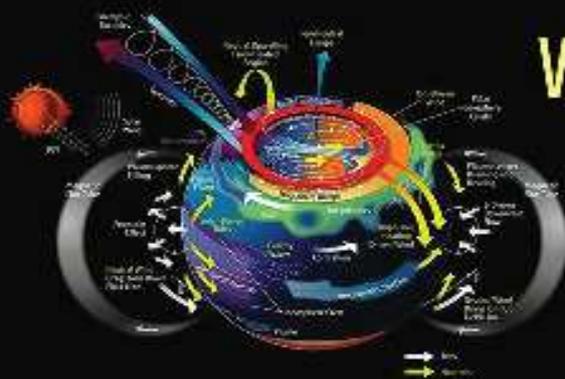
**Physics**

**New Titles - May 2018**

PHYSICS RESEARCH AND TECHNOLOGY

# Geomagnetosphere and Coupling Phenomena

Solar Wind/IMF Coupling with  
Geomagnetosphere/Ionosphere



**Volume I**

**Lev I. Dorman**

NOVA

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Acoustics  
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&  
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Advances in  
Energy Research

Classical &  
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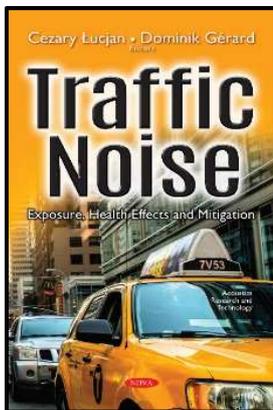
Physics  
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## Acoustics Research & Technology Series



### **Traffic Noise**

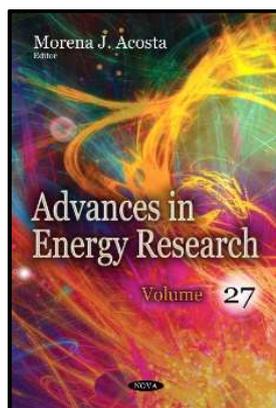
#### **Exposure, Health Effects & Mitigation**

Edited by Cezary Łucjan, Dominik Gérard

In the book's opening chapter, Nefta Eleftheria Votsi, PhD, Athanasios Kallimanis, PhD, and Ioannis Pantis, PhD methodically review present collected works to clarify Quiet Areas categories to identify research gaps and establish guidelines for the addition of Quiet Areas initiatives in cohesive environmental management approaches. Next, Angel M. Dzhambov, MD and Donka D. Dimitrova, PhD examine the risk of hypertension connected to road traffic noise exposure in different ethnic groups in Bulgaria. Supplementing this, Hussein M Elmehdi, PhD discusses noise exposure and related health risks with the goal to connect the results of measured noise exposures to sleep disturbance and annoyance. Angel M. Dzhambov, MD proves a review of literature on traffic noise reduction by vegetation. Then, Janusz Bohatkiewicz, PhD and Maciej Ha<sup>3</sup>ucha present a study on quiet pavements. Ending the book, David Isaac Ibarra Zarate gives an overview of the issue of road traffic noise while also presenting possible solutions.

HB 9781536125504 £169.99 October 2017 Nova Science Publishers 241 pages

## Advances in Energy Research Series



### Advances in Energy Research Volume 27

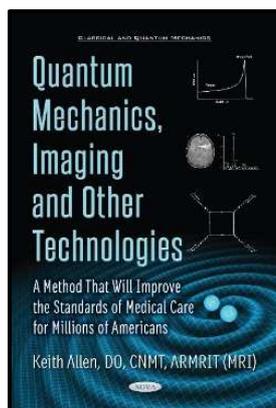
Edited by Morena J. Acosta

In this book, Chapter One reviews the environmental impact -- on human health, natural systems and natural resources -- in physical units and outlined the limitations and the challenges that are derived from an ecosystem service valuation based on monetary values --including ecosystem disservices with associated negative monetary values. Chapter Two is focused on the analysis of TES technologies that provide a way of valorising solar heat and reducing the energy demand of buildings. Chapter Three investigates the prospects of a key enabling technology for large-scale injection of wind turbine energy to the electric power grid. Chapter four discusses how simple wet acid surface texturing methods for green energy-silicon solar energy are marked aim to provide the vital information about the growing field in solar energy with an environmental friendly nature. Chapter Five verifies the improvement performance by various components of the Enhance PSO, the ICA and the Wavelet in the forecasting frameworks. Chapter Six presents predictive current control(PCC) strategy for back-to-back connected voltage source converter employed in PMSG wind energy conversion systems.

**Volume 27** HB 9781536123050 £82.99 September 2017 Nova Science Publishers 180 pages

**Volume 28** HB 9781536126990 £82.99 December 2017 Nova Science Publishers 165 pages

## Classical & Quantum Mechanics Series



### Quantum Mechanics, Imaging & Other Technologies A Method That Will Improve the Standards of Medical Care for Millions of Americans

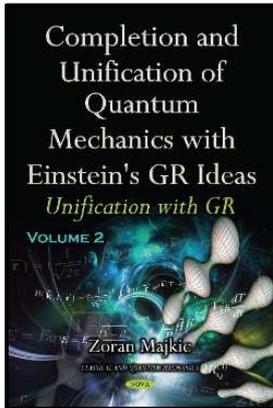
Keith Allen

The author wrote this book to accomplish three major objectives: 1) For the appreciation of science, the philosophy of science and its beauty and wonder; 2) to explore the quantum paradigm and other important developments in science that are leading the way to important progress in key areas of research; and most importantly, 3) to appreciate how medical technologies are important medical tools that can improve the human condition.

With regard to the first objective, as Carl Sagan implied, science provides us with a better understanding of who we are, our humanity, and even our role in the Universe. Science is a doorway to deeper knowledge about both ourselves and the world we live in. The author thinks that there is nothing more important we as a species can do in this life than to appreciate the beauty and order of our Universe!

The quantum paradigm along with the relativity theory are currently some of our most advanced theories. The author has applied these theories in important ways to medical technologies. Specifically, he explains PET and MRI imaging according to the quantum paradigm, and MEG according to special relativity theory. It was the author's intent to use the most advanced theories known to provide the best explanation for the operation of these technologies. Consistent with this objective, he made an effort to approach current theoretical limits by discussing quantum field theory and its important applications in PET and MRI imaging technologies.

PB 9781536118131 £71.50 October 2017 Nova Science Publishers 220 pages



## Completion & Unification of Quantum Mechanics with Einstein's GR Ideas Part II: Unification with GR

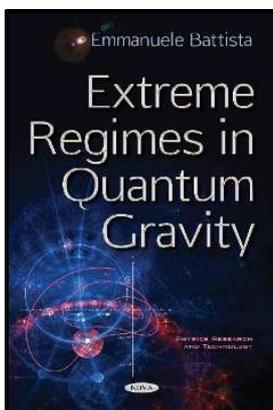
Zoran Majkic

The proposed completion of QM theory, with the new non-probabilistic equations and a new mathematical basis for the deterministic quantum mechanics is presented here as a conservative extension of the Standard QM by 3-dimensional (of rest mass energy density) elementary particles. This theory can reshape our view of the quantum world, allowing us to include also classical gravity and to answer some of the deep unresolved questions at the heart of quantum mechanics. This new theory of particles is a constructive approach, alternative to the string theory. Thus, it avoids the infinitary problems of the inverse square for gravitational and electric forces and may be used as a formal basis for Einstein's unification theory. This second volume is the continuation of Part I and is dedicated to its unification with General Relativity (GR) and with higher dimensions used for the particle's properties, such as electrical charge, spin, colors, etc.

In Chapter One, after a brief presentation of the main results obtained in Part I, the concepts of GR theory, tensors, and differential pseudo-Riemannian 4-dimensional time-space manifolds are gradually introduced sufficiently for a self-contained presentation and derivation of these new covariant equations. Then, the unification of this newly completed deterministic QM with the GR theory is provided. Chapter Two introduces and examines the extremely small, compacted higher dimensions in order to integrate the charge and spin properties of the elementary particles in a complete quantum physics theory for elementary particles. Chapter Three considers the higher dimensional wave packets of the particles and their reduction to the 4-dimensional time-space, and particles' vector kets in the higher-dimensional manifold framework.

HB 9781536119473 £199.99 December 2017 Nova Science Publishers 360 pages

## Construction Materials & Engineering Series



### Extreme Regimes in Quantum Gravity

Emmanuele Battista

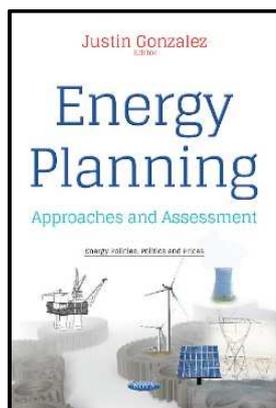
This book is divided into two parts. The low-energy limit of quantum gravity is analysed in the first half of the book, whereas in the second half of the book, the authors explain the high-energy domain.

In the first part, by applying the effective field theory point of view to the quantization of general relativity, detectable, though tiny, quantum effects in the position of Newtonian Lagrangian points of the Earth-Moon system are found. In order to make more realistic the quantum corrected model proposed, the full three-body problem where the Earth and the Moon interact with a generic massive body as well as the restricted four-body problem involving the perturbative effects produced by the gravitational presence of the Sun in the Earth-Moon system are also studied. After that, a new quantum theory having general relativity as its classical counterpart is analysed. By exploiting this framework, an innovative interesting prediction involving the position of Lagrangian points within the context of general relativity is described. Furthermore, the new pattern provides quantum corrections to the relativistic coordinates of Earth-Moon libration points of a few millimetres.

The second part of the book deals with the Riemannian curvature characterizing the boosted form assumed by the Schwarzschild-de Sitter metric. The analysis of the Kretschmann invariant and the geodesic equation shows that the spacetime possesses a "scalar curvature singularity" within a 3-sphere and that it is possible to define what the authors refer to as a "boosted horizon", which is a sort of elastic wall where all particles are surprisingly pushed away, suggesting that such "boosted geometries" are ruled by a sort of "antigravity effect". Eventually, the equivalence with the coordinate shift method is invoked in order to demonstrate that all  $\ddot{a}^2$  terms appearing in the Riemann curvature tensor give a vanishing contribution in the distributional sense.

HB 9781536123364 £169.99 September 2017 Nova Science Publishers 278 pages

## Energy Policies, Politics & Prices Series



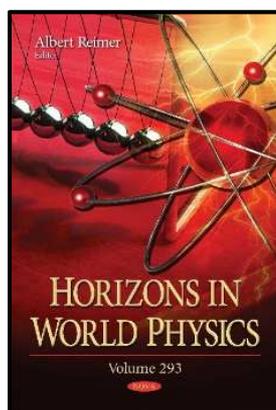
### Energy Planning Approaches & Assessment

Edited by Justin Gonzalez

In this book, Chapter One proposes new tools for energy planning under sustainable development paradigm through models, procedures and methodologies. Chapter Two focuses on Home Energy Planning Systems applied to the residential sector. In Chapter Three, the possibilities to use geothermal technologies in Spain and whether they can reach generation objectives is examined. Chapter Four focuses on the impact that the grid regulatory framework, in force in several islands has had both from the technical and economical point of view, regarding their renewable energy development.

PB 9781536123005 £71.50 September 2017 Nova Science Publishers 105 pages

## Horizons in World Physics Series



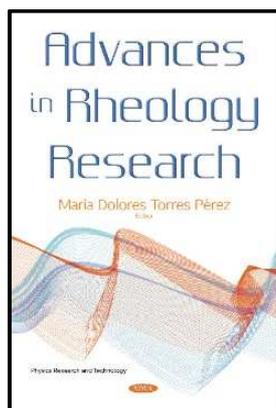
### Horizons in World Physics

Edited by Albert Reimer

In chapter one, M. V. Abramov, A. P. Kussyak, O. M. Kaminskiy, S. P. Turanska, A. L. Petranovska, N. V. Kussyak, and P. P. Gorbyk present research aimed at the progression of the concept for the development of magnetosensitive nanocomposites with multilevel hierarchical nanoarchitecture and functions of biomedical nanorobots. Afterwards, A. Zubow, K. Zubow and V. A. Zubow propose a mechanism for the photoelectric effect based on gravity in chapter two, with the photoelectric effect being modeled by shifting the equilibrium. In chapter three, Kouichi Nakagawa studies the potential use of a sucrose dosimeter to estimate linear energy transfer and absorbed dose of heavy ion and X-ray radiation. In chapter four, Xiaoping Sun, PhD explores the electron paramagnetic resonance of various charge-transfer reactions giving radical pairs. Next, in chapter five, A.L. Gyulbudaghian concludes that the radial systems of dark globules are of two types based on surveys of the northern and southern hemispheres. In chapter six, Lorenzo Zaninetti presents research using a thermal model and a second cold model, comparing both with the results of numerical hydro-dynamics. In chapter seven, Michael L. Smith and Ahmet M. Özta<sup>o</sup> present findings that a marginally modified Schwarzschild relationship foretells the nature of gravitational attraction by subatomic and atomic particles. In chapter eight, Janusz Garecki summarizes past articles on gravitational radiation wherein it has been shown that the real gravitational waves possessing a non-vanishing Riemann tensor constantly carry energy-momentum. Lastly, in chapter nine, Daria A. Tretyakova, PhD and Timur M. Adyev examine null geodesics for the scalar-tensor black holes in the Horndeski non-minimal kinetic coupling framework.

**Volume 293** HB 9781536125115 £217.50 October 2017 Nova Science Publishers 196 pages

**Volume 294** HB 9781536125153 £217.50 November 2017 Nova Science Publishers 185 pages

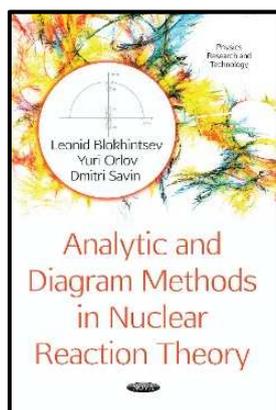


### **Advances in Rheology Research**

Edited by Maria Dolores Torres Perez

*Advances in Rheology Research* has been divided into fourteen chapters. The renowned authors of this volume discuss current advances in rheology research for different application fields, covering theoretical and experimental scientific contributions. The fourteen chapters include discussions on a wide range of outstanding rheological issues such as rheology and 3D printing; rheological characterization of injection grouts using rotational rheometry; analysis of rheological properties of 100% liquid CO<sub>2</sub> based gel fracturing fluid; rheology applied to food product design; miscibility and viscoelastic properties of poly(styrene-co-acrylonitrile) blends; rheology of honey; unusual nonlinear rheological behavior of branched polymers: multiple overshoots in stress growth, experiments and theory; viscosity and viscoelasticity of baby foods; rheology as an instrument for food development; using the Laplace transform in rheology kinetic modeling; design of vibration absorbers using the rheological properties of viscoelastic materials; a viscoelastic fluid due to a non-linear accelerating elastic sheet; an MHD boundary layer viscoelastic fluid flow over a stretching sheet in a porous medium; and thermal radiation effect on fully developed laminar mixed convection flow in a vertical porous stratum by using a differential transform method. All of the above chapters are intended to contribute the improvement understanding of the rheological characterization and performance in numerous application fields from the food to the non-food industries.

HB 9781536128758 £199.99 December 2017 Nova Science Publishers 347 pages

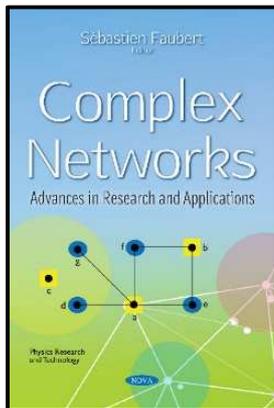


### **Analytic & Diagram Methods in Nuclear Reaction Theory**

Leonid Blokhintsev, Yuri Orlov, Dmitri Savin

Using the analyticity property of the amplitudes of physical processes allows one to obtain important relations connecting various physical quantities. These relations can be established without specifying the concrete form of the interaction between particles, which is often poorly known. The analytic methods make use of the unitarity property of the S-matrix and the formalism of the Feynman diagrams. The present book is devoted to a systematic description of the analytic and diagram methods in the theory of nuclear reactions at low and intermediate energies. First, a general overview of the unitarity and analyticity properties of the S- and T-matrices is presented. Then the general theory of non-relativistic Feynman diagrams, their specific features and the analytic properties of their amplitudes is described. Three- and four-prong vertex functions of the non-relativistic Feynman diagrams are among the topics that are addressed and discussed, including the important relation between vertex functions and the asymptotic form of the nuclear bound-state wave functions. Specific approaches to describing nuclear reactions, which use analytic and diagram methods are outlined. These methods include the dispersion K-matrix approach, the dispersion relations, and the Trojan horse method. A part of the book deals with the asymptotic normalization coefficients (ANCs). ANCs are fundamental nuclear characteristics that are important in nuclear reaction and nuclear structure physics as well as in nuclear astrophysics. They are used actively in the analysis of nuclear reactions, in particular in considering the creation of elements in the Universe. Various methods of determining ANCs are overviewed. One chapter of the book is devoted to the methods of obtaining information on the features of bound nuclear states by an analytic continuation of the scattering data. The analytic continuation of the Lippmann-Schwinger and Faddeev integral equations onto unphysical energy sheets, which can be used for finding the position and width of resonances and the virtual (antibound) states is described. A generalization of wave function normalization to the Gamow states is outlined.

PB 9781536128093 £71.50 November 2017 Nova Science Publishers 89 pages

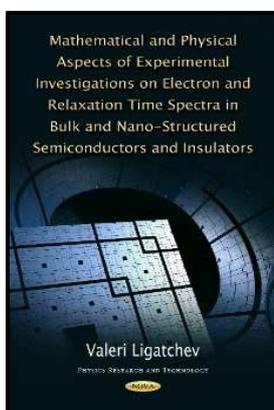


## **Complex Networks** **Advances in Research & Applications**

Edited by Sébastien Faubert

Chapter One focuses on investigational data on the fluorescence of DNA complexes inside neutrophils in flow cytometry with nanometer spatial resolution. Fluorescence visualizes oxidative activity of all coding and non-coding DNA parts in the full set of chromosomes. Chapter Two studies real-world networks based on a centrality metric called the Leverage Centrality metric which has been recommended as a means of identifying neighborhood hubs. The LevC of a node is a comparative measure of the connectivity of a node vis-a-vis its neighbors. In Chapter Three, the author goes on to examine neighborhood overlap, bipartivity index, and algebraic connectivity as edge centrality metrics to measure the consistency of links for mobile sensor networks. For several instances of node density and mobility, the author observes the stability of the network-wide data gathering trees determined using the proposed three edge centrality metrics to be significantly larger than the stability of the LET-based data gathering trees. Finally, Chapter Four proposes a fusion condition with the goal of preventing wrong fusions and alleviating the effect of the resolution limit. The suggested condition can also be used in other algorithms that make community fusions.

PB 9781536128338 £71.50 December 2017 Nova Science Publishers 168 pages

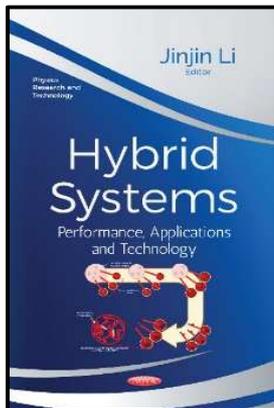


## **Mathematical & Physical Aspects of Experimental Investigations on Electron & Relaxation Time Spectra in Bulk & Nano-Structured Semiconductors & Insulators**

Valeri Ligatchev

This book summarizes important outcomes of a quarter century of developments in advanced mathematical approaches and their implementations for deconvolution. The analysis of electron and relaxation time spectra obtained from the results of appropriate physical experiments fulfilled on real samples of bulk amorphous/crystalline semiconductors and insulators as well as on nano-structured materials and devices are also discussed. The second chapter of this book depicts key features of many well-known traditional and some modern techniques for experimental investigations of electron density and time relaxation spectra in such semiconductors and insulators. Additionally, there is an emphasis on archetypal problems related to the analysis and interpretation of the results of those experimental techniques. Some generic (though crucially important in the context of this book) physical and mathematical aspects of the polarization and relaxation processes in solids, well-known one-dimensional direct and inverse integral transforms, linear integral equations of the first and second kinds, "ill-posed" mathematical problems and specific mathematical approaches to solution(s) of those are discussed in the third, fourth and fifth chapters, respectively. A majority of the aforementioned mathematical approaches are essentially based on the so-called "regularization" concept, pioneered by famous Russian mathematicians (A. N. Tikhonov, M. M. Lavrentiev, V. K. Ivanov, V. Ya. Arsenin and their co-workers) in the second half of the twentieth century. Mathematical aspects of the regularization concept are discussed (to some extent) in the fifth chapter of the book in comparison to the similar aspects of the traditional "modelling" approach with multiple references on appropriate "original" articles and books. Thanks to distinctive features of the regularization concept, it endures a protracted history (which nowadays well exceeds 5 decades), becomes the dominant strategy for the solution of various "inverse problems", and is widely used in many types of modern applications and computational packages. In particular, the regularization algorithms are incorporated into Mathematica, Matlab, Python and Octave packages.

HB 9781536125665 £199.99 January 2018 Nova Science Publishers 362 pages

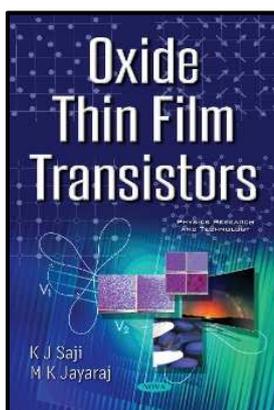


## Hybrid Systems Performance, Applications & Technology

Edited by Jinjin Li

Hybrid systems, inheriting the merits of their predecessors, exhibit extraordinary strengths to face various challenges and hostile environments. Hybrid systems have the ability to inspire and encourage researchers and engineers to propose novel ideas, which allow for more applications and devices in physics, chemistry and biology. In this book, the authors introduce various applications of hybrid methods, hybrid models, hybrid systems and hybrid materials by taking advantage of high performance and better implementation of hybrid structures. This book covers both theoretical methods and practical realizations from distinct disciplines by introducing the recent advances of hybrid structures.

HB 9781536124880 £139.50 October 2017 Nova Science Publishers 185 pages

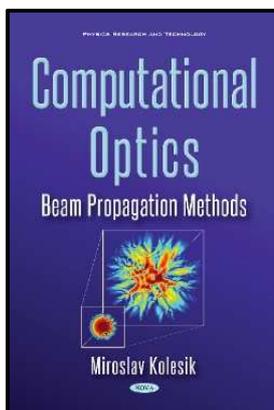


## Oxide Thin Film Transistors

K. J. Saji

Transparent flexible electronics is an emerging technology which makes use of wide band gap semiconductors that can be processed at low temperatures on glass or plastic substrates. Electronic systems that cover large area and curved surfaces together with transparency bring the possibility of numerous applications that are outside the scope of rigid wafer based electronics. Flexible electronics, electronic textiles, a wearable wellness system, and sensory skin are some of the applications of flexible electronics. The key factor in the realization of transparent electronics is the development of high performance fully transparent thin film transistors. Thin film transistors (TFTs) based on transparent conducting amorphous oxide semiconductors (TAOS) such as InGaZnO (IGZO), zinc tin oxide (ZTO), zinc indium tin oxide (ZITO), etc. provide additional functionalities like transparency, high field effect mobility and potential for room temperature processing. The performance of these TAOS based TFTs are superior to their silicon (a-Si:H TFTs) and organic TFTs.

HB 9781536123739 £169.99 October 2017 Nova Science Publishers 150 pages

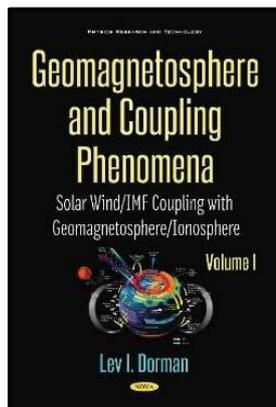


## Computational Optics Beam Propagation Methods

Miroslav Kolesik

*Computational Optics: Beam Propagation Methods* gives a comprehensive discussion of the theory, numerical methods, and best practices in the field of computer-aided modeling of optical-beam propagation. Derived from a course taught by the author, the textbook is designed to support both independent self-paced study and a traditional semester-long lecture. The book combines two complementary tracks. The theory part provides a detailed, incremental exposition of the physics of optical beam propagation, and a description of the relevant numerical techniques. The practice-track gives an opportunity to put the theory into use by guiding the reader through increasingly sophisticated examples, which cover program design and simulation execution as well as a critical assessment of the results. Written for a readership with modest experience in numerical simulations and programming, this textbook integrates both tracks into a story flowing in easy to digest increments, covering topics from the basics to the state of the art in the field.

HB 9781536123340 £199.99 September 2017 Nova Science Publishers 330 pages



## Geomagnetosphere and Coupling Phenomena, Volume I Solar Wind/IMF Coupling with Geomagnetosphere/Ionosphere

Lev I. Dorman

The present review book by Prof., Dr. Lev I. Dorman, *Plasmas and Energetic Processes in Geomagnetosphere* reflects the development of the geomagnetosphere's research and applications for the last few decades. The importance and actuality of geomagnetosphere research are based on the following three factors:

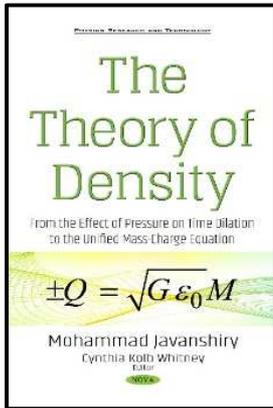
1. The geomagnetosphere is the nearest giant natural laboratory, where it is possible via satellites and ground measurements to investigate in detail many different plasmas and energetic processes in space, which are caused by an interaction of high kinetic energy solar wind plasmas and its perturbations (Interplanetary Coronal Mass Ejections - ICMEs, Interplanetary Shock Waves – ISWs, Interplanetary Interaction Regions – IIR), including those frozen in the Interplanetary Magnetic Fields (IMF) with the rotated main geomagnetic field. This interaction leads to the dynamic transformation of magnetic fields in the geomagnetosphere, generation and trapping of high energy particles (which are known as Magnetospheric Cosmic Rays – MCR), and the generation of many types of instabilities and electromagnetic radiations. These processes are in principle similar to processes in magnetospheres of other planets and their moons, in the atmosphere of the sun and other stars, in interplanetary and in interstellar space, and in many different astrophysical objects. This research is an important basis for fundamental space and astrophysical science.

2. Today, technology, economics, navigation, TV, Internet, radio connections, military aspects, and the life of people on our planet are strongly connected to the work of many satellites moving inside the geomagnetosphere. Different processes and MCR in the geomagnetosphere influence the satellites' work and often lead to satellite malfunctions up to fully destroying their electronics; satellites essentially “die” in these cases. The described research can be considered as a basis for developing methods of forecasting dangerous situations for satellites in different orbits and to decrease the risk of satellite malfunctions and loss.

3. The interaction of ICME, ISW, and IIR with the geomagnetosphere leads to the generation of big magnetic storms accompanied with a Forbush decrease and precursory effects in Galactic Cosmic Ray (GCR) intensity. These magnetic storms are dangerous not only to satellites, but also to the Earth's surface in terms of technology, radio connections, car accidents, and human health (e.g., increasing the frequency of infarct myocardial and brain strokes). Investigations of causes of magnetic storms can help to develop methods of forecasting and decreasing the level of magnetic storm hazards. Therefore, the other practical application of this research is connected with the problem of space weather and space climate influence on the technology, radio connections, navigation, transportation, and people's health on the Earth, which is independent of altitude and geomagnetic latitude.

**Volume I** HB 9781536105643 £234.99 January 2018 Nova Science Publishers 506 pages

**Volume II** HB 9781536122701 £199.99 October 2017 Nova Science Publishers 450 pages



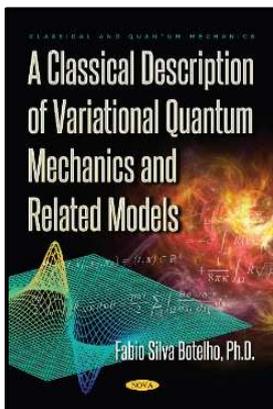
## The Theory of Density From the Effect of Pressure on Time Dilation to the Unified Mass-Charge Equation

Mohammad Javanshiry

The main parts of this book consist of three long articles that have previously been published by the Galilean Electrodynamics journal during three succeeding years as special summer issues. The subject is a new theory of ether that has been developed. This version of ether is compatible with special relativity theory (SRT), and thus it cannot be considered as an absolute frame of reference. One of the virtues of this book is that many of the novel predictions can be tested in high-tech laboratories; moreover, the book includes some new and extraordinary physical concepts that make the proposed claims rational and plausible. The words on the front page, "From the effect of pressure on time dilation to the unified mass-charge equation," are not intended as a gossipy slogan, the likes of which sometimes appear in pseudoscientific media or science-fiction books; it is a true motto with a deep and physical basis. It is up to the reader, however, to judge whether or not the book really does what it sets out to do.

Unfortunately, most of the recent theories in physics, with no clear deployment against the main tenets of relativity or quantum mechanics, are inflated in a way to be comprehensively explanatory, whereas there are few or no experimental evidences that support these theories as good descriptions of nature.

PB 9781536121056 £71.50 September 2017 Nova Science Publishers 105 pages



## A Classical Description of Variational Quantum Mechanics and Related Models

Fabio Silva Botelho

In this text, the author establishes a connection between classical and quantum mechanics through the normal field definition and related wave function concept.

Indeed, the author proposes a new energy which includes both classical and quantum mechanics in a unified framework. Concerning such energy, they show that if  $\hbar \ll m$ , where  $m$  denotes the total system mass, then the energy is experienced in a classical mechanics context, whereas if the approximation  $r(x,t) \approx x$  is assumed, where  $r(x,t)$  denotes point-wise the particle classical field of position, and for appropriate  $m$  values the standard Schrödinger energies are re-obtained.

Among the examples of applications concerning the proposal, the author highlights the hydrogen atom as one example, where both the proton and electron are allowed to move. The consistent result of a proton mass concentration at  $r = 0$  is obtained.

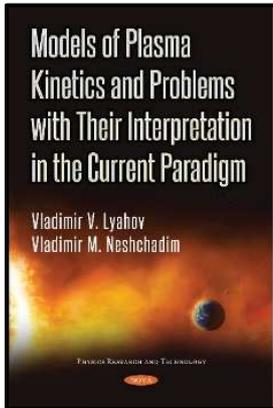
The author also develops a procedure to obtain eigenvalues of a positive definite symmetric matrix.

The novelty here, concerning previous results in the book entitled *Functional Analysis and Applied Optimization in Banach Spaces*, are the rigorous proofs presented.

Indeed, the results seem to be applicable to more general matrices. However, the author postpones the proof of such general results for future research.

In the last chapter, a complete and rigorous existence result for the Ginzburg-Landau system of superconductivity is presented. A duality principle and related optimality conditions are also developed. In the final section, the author presents research concerning numerical results for three-dimensional models in superconductivity.

HB 9781536130591 £71.50 February 2018 Nova Science Publishers 112 pages



## **Models of Plasma Kinetics and Problems with Their Interpretation in the Current Paradigm**

Vladimir V. Lyahov, Vladimir V. Neshchadim

Proposed by A.A. Vlasov in 1938, the kinetic equation with a self-consistent electromagnetic field led to a fundamentally new perspective in plasma physics. This equation represents the most profound approach to the description of plasma because it operates directly with plasma particles using the distribution function. Plasma is found everywhere in space; that is why this equation has an extensive application. A large number of works where the study of plasma properties based on the solution of the Vlasov equation have appeared.

However, the results based on the solution of the Vlasov equation should be assumed with caution. As noted in the manuscript, the Vlasov equation has a set of formal solutions. The researcher must have the ability to select the correct solutions, correct in the sense of their adequacy to the processes under investigation.

Some aspects of the polarization of a magnetoactive plasma are investigated. It is shown that neglecting the electric field in problems of such sharply inhomogeneous structures as a boundary or current layers leads to an inadequate model. Thus, the successive solution of the kinetic equation taking into account the electric polarization field indicates that the equations describing the equilibrium of these sharply inhomogeneous structures become nonlinear and exhibit the property of structural instability.

Natural science over time included the expansion of the field of numbers from natural to real. Now, physics is in the stage of semi-recognition of complex numbers. On the one hand, when solving the differential equation, the physicist finds the value of the roots of the characteristic equation in a complex field. However, at the final stage, all imaginary parts are discarded, and only real values of physical quantities are passed in response. In this case, the complex field has a fundamental feature that distinguishes it: it is algebraically closed. The restriction of physical quantities only to the field of real numbers seems logically unsatisfactory since often mathematical operations derive them from the field of the original definition. In this manuscript, some problems of the complexification of physics are investigated.

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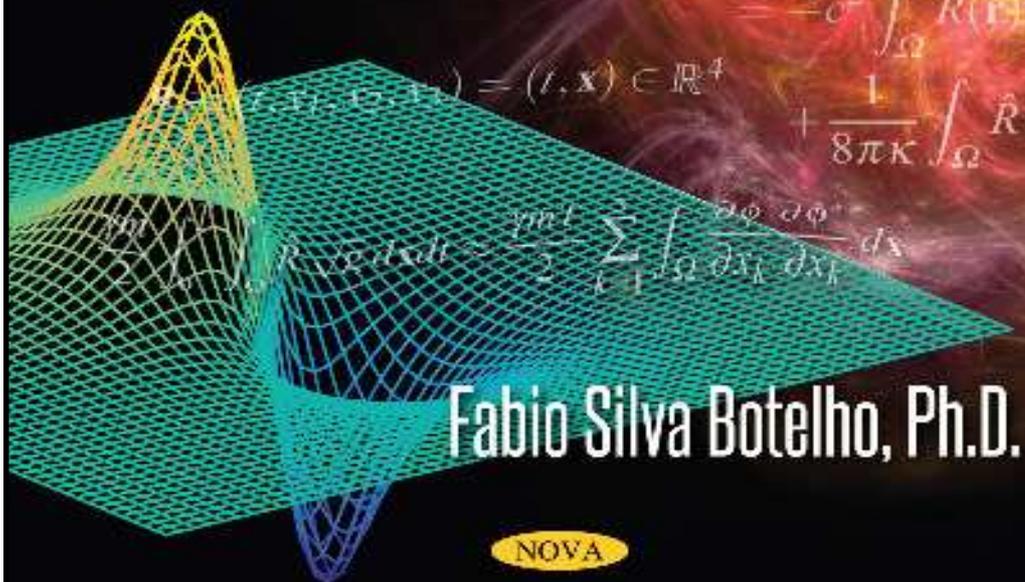
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