Dimensional Analysis And Theory Of Models

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AstrophysicsA Study of Dimensional AnalysisUniversity PhysicsDimensional Analysis and Theory of ModelsDimensional AnalysisRecent Developments in Infinite-Dimensional Analysis and Quantum ProbabilityApplied Dimensional Analysis and ModelingA Student's Guide to Dimensional AnalysisDimensional Analysis of Food Processes

Introduction to Infinite Dimensional Stochastic Analysis

Dimensional Analysis for Engineers

Based on well-known lectures given at Scuola Normale Superiore in Pisa, this book introduces analysis in a separable Hilbert space of infinite dimension. It starts from the definition of Gaussian measures in Hilbert spaces, concepts such as the Cameron-Martin formula, Brownian motion and Wiener integral are introduced in a simple way. These concepts are then used to illustrate basic stochastic dynamical systems and Markov semi-groups, paying attention to their long-time behavior.

Dimensional Analysis and Scale-up in Chemical Engineering

Dimensional Analysis And Similitude (Through Worked Examples)

University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science

educators dedicated to the project. VOLUME I Unit 1: Mechanics Chapter 1: Units and Measurement Chapter 2: Vectors Chapter 3: Motion Along a Straight Line Chapter 4: Motion in Two and Three Dimensions Chapter 5: Newton's Laws of Motion Chapter 6: Applications of Newton's Laws Chapter 7: Work and Kinetic Energy Chapter 8: Potential Energy and Conservation of Energy Chapter 9: Linear Momentum and Collisions Chapter 10: Fixed-Axis Rotation Chapter 11: Angular Momentum Chapter 12: Static Equilibrium and Elasticity Chapter 13: Gravitation Chapter 14: Fluid Mechanics Unit 2: Waves and Acoustics Chapter 15: Oscillations Chapter 16: Waves Chapter 17: Sound

Analysis of Multivariate and High-Dimensional Data

Dimensional Analysis and Group Theory in Astrophysics describes how dimensional analysis, refined by mathematical regularity hypotheses, can be applied to purely qualitative physical assumptions. The book focuses on the continuous spectral of the stars and the mass-luminosity relationship. The text discusses the technique of dimensional analysis, covering both relativistic phenomena and the stellar systems. The book also explains the fundamental conclusion of dimensional analysis, wherein the unknown functions shall be given certain specified forms. The Wien and Stefan-Boltzmann Laws can be significant in the systematic application of dimensional analysis to the physics of a single star. The text also discusses group-theoretical reduction of ordinary differential equations and the reductions of

the differential equations of stellar structure. The structure of a stellar envelope requires three hypotheses: (1) thermo-nuclear reactions as source of energy of stellar; (2) thermo-nuclear reactions occur at the star's core; and (3) that an envelope surrounding the core exists where no radiation is generated. To complete the model of a star, the investigator should have further assumptions such as the pressure is made-up of gas, radiation, or both. The book can prove helpful for astronomers, astro-physicists, cosmologists, and students of general physics.

Dimensional Analysis and Theory of Models

By examining some of the basic scaling questions, such as the importance of measurement levels, the kinds of variables needed for Likert or Guttman scales and when to use multidimensional scaling versus factor analysis, Jacoby introduces readers to the most appropriate scaling strategies for different research situations. He also explores data theory, the study of how real world observations can be transformed into something to be analyzed, in order to facilitate more effective use of scaling techniques.

Social Organization and Social Process

Dosage calculations can be intimidating, but they don’t need to be. Dimensional

analysis is an easy, systematic approach that shows you how to master simple to complex calculations with consistency and accuracy and reduce medication errors with simple safety mechanisms.

Dimensional Analysis Beyond the Pi Theorem

This monograph provides the fundamentals of dimensional analysis and illustrates the method by numerous examples for a wide spectrum of applications in engineering. The book covers thoroughly the fundamental definitions and the Buckingham theorem, as well as the choice of the system of basic units. The authors also include a presentation of model theory and similarity solutions. The target audience primarily comprises researchers and practitioners but the book may also be suitable as a textbook at university level.

Dimensional Analysis and Self-Similarity Methods for Engineers and Scientists

This text was born out of an advanced mathematical economics seminar at Caltech in 1989-90. We realized that the typical graduate student in mathematical economics has to be familiar with a vast amount of material that spans several traditional fields in mathematics. Much of the mate rial appears only in esoteric

research monographs that are designed for specialists, not for the sort of generalist that our students need be. We hope that in a small way this text will make the material here accessible to a much broader audience. While our motivation is to present and orga nize the analytical foundations underlying modern economics and finance, this is a book of mathematics, not of economics. We mention applications to economics but present very few of them. They are there to convince economists that the material has so me relevance and to let mathematicians know that there are areas of application for these results. We feel that this text could be used for a course in analysis that would benefit math ematicians, engineers, and scientists. Most of the material we present is available elsewhere, but is scattered throughout a variety of sources and occasionally buried in obscurity. Some of our results are original (or more likely, independent rediscoveries). We have included some material that we cannot honestly say is neces sary to understand modern economic theory, but may yet prove useful in future research.

Infinite Dimensional Analysis

Dimensional analysis is a magical way of finding useful results with almost no effort. It makes it possible to bring together the results of experiments and computations in a concise but exact form, so that they can be used efficiently and economically to make predictions. It takes advantage of the fact that phenomena

go their way independently of the units we measure them with, because the units have nothing to do with the underlying physics. This simple idea turns out to be unexpectedly powerful.Students often fail to gain from dimensional analysis, because bad teaching has led them to suppose it cannot be used to derive new results, and can only confirm results that have been secured by some other route. That notion is false. This book demonstrates what can be done with dimensional analysis through a series of examples, starting with Pythagoras' theorem and the simple pendulum, and going on to a number of practical examples, many from the author's experience in ocean engineering. In parallel, the book explains the underlying theory, starting with Vaschy's elegant treatment, whilst avoiding unnecessary complexity. It also explores the use and misuse of models, which can be useful but can also be seriously misleading.

Dimensional Analysis and Theory of Models

Shell Theory and Three-dimensional Analysis of Cylindrical Shells Subjected to Axisymmetric, Tangential Surface Loads

Spectral Methods in Infinite-Dimensional Analysis

Recent Developments in Infinite-Dimensional Analysis and Quantum Probability is dedicated to Professor Takeyuki Hida on the occasion of his 70th birthday. The book is more than a collection of articles. In fact, in it the reader will find a consistent editorial work, devoted to attempting to obtain a unitary picture from the different contributions and to give a comprehensive account of important recent developments in contemporary white noise analysis and some of its applications. For this reason, not only the latest results, but also motivations, explanations and connections with previous work have been included. The wealth of applications, from number theory to signal processing, from optimal filtering to information theory, from the statistics of stationary flows to quantum cable equations, show the power of white noise analysis as a tool. Beyond these, the authors emphasize its connections with practically all branches of contemporary probability, including stochastic geometry, the structure theory of stationary Gaussian processes, Neumann boundary value problems, and large deviations.

Scaling, Self-similarity, and Intermediate Asymptotics

Dimensional Analysis in the Identification of Mathematical Models

The infinite dimensional analysis as a branch of mathematical sciences was formed in the late 19th and early 20th centuries. Motivated by problems in mathematical physics, the first steps in this field were taken by V. Volterra, R. GateallX, P. Levy and M. Frechet, among others (see the preface to Levy[2]). Nevertheless, the most fruitful direction in this field is the infinite dimensional integration theory initiated by N. Wiener and A. N. Kolmogorov which is closely related to the developments of the theory of stochastic processes. It was Wiener who constructed for the first time in 1923 a probability measure on the space of all continuous functions (i. e. the Wiener measure) which provided an ideal math ematical model for Brownian motion. Then some important properties of Wiener integrals, especially the quasi-invariance of Gaussian measures, were discovered by R. Cameron and W. Martin[l, 2, 3]. In 1931, Kolmogorov[l] deduced a second partial differential equation for transition probabilities of Markov processes order with continuous trajectories (i. e. diffusion processes) and thus revealed the deep connection between theories of differential equations and stochastic processes. The stochastic analysis created by K. Ito (also independently by Gihman [1]) in the forties is essentially an infinitesimal analysis for trajectories of stochastic processes. By virtue of Ito's stochastic differential equations one can construct diffusion processes via direct probabilistic methods and treat them as function als of Brownian paths (i. e. the Wiener functionals).

Developing Grounded Theory

Derived from a course in fluid mechanics, this text for advanced undergraduates and graduate students employs symmetry arguments to illustrate the principles of dimensional analysis. 2006 edition.

Dimensional Analysis and Similarity Theory in Applied Mechanics and Heat Transfer

This book is the first textbook with the generalization of Dimensional Analysis, specially prepared to solve problems of identification of mathematical models based on experimental data. The generalization gives the possibility of mathematical model invariant with regard to gauge group, groups of rotation and others. The resulting formalism generates the most general and tensor homogeneous form of possible functional dependence. Contents:Drobot's Dimensional Space and a Classical Theory of MeasurementsA Dimensional Analysis and the Construction of Empirical ModelsMulti-Stage Identification and the Dimensional Complex FunctionAlgorithmic Procedures in the Construction of Empirical ModelsDimensional Space Description of the ConstructionTheorem p including the Geometry of Dimensional QuantitiesAn Identification of Invariant Functions Readership: Engineers and researchers in applied sciences and technology. Keywords:Dimensional Analysis;Dimensional Space;Theory of Measurement;Dimensional Geometry;Theorem pi;Similarity;Invariant Dimensional

Models;Identification of Invariant Models;Multistage Identification of Invariant Model;Complex Dimensional Function;Invariance in Relation to SO(n) and Gl(n) Goups

Similarity and Dimensional Methods in Mechanics

Grounded theory is the most popular genre of qualitative research used in the health professions and is widely used elsewhere in the research world. In this volume, six key grounded theory methodologists examine the history, principles, and practices of this method, highlighting areas in which different strands of the methods diverge. Chapters cover the work of Anselm Strauss, Barney Glaser, Leonard Schatzman, and the postmodern and constructivist schools. Dialogues between the participants sharpen the debate and show key topics of agreement and disagreement. This volume will be ideal for courses on grounded theory that wish to show the ways in which it can be used in research studies.

Maximum Entropy and Bayesian Methods

Bayesian probability theory and maximum entropy methods are at the core of a new view of scientific inference. These `new' ideas, along with the revolution in computational methods afforded by modern computers, allow astronomers,

electrical engineers, image processors of any type, NMR chemists and physicists, and anyone at all who has to deal with incomplete and noisy data, to take advantage of methods that, in the past, have been applied only in some areas of theoretical physics. This volume records the Proceedings of Eleventh Annual `Maximum Entropy' Workshop, held at Seattle University in June, 1991. These workshops have been the focus of a group of researchers from many different fields, and this diversity is evident in this volume. There are tutorial papers, theoretical papers, and applications in a very wide variety of fields. Almost any instance of dealing with incomplete and noisy data can be usefully treated by these methods, and many areas of theoretical research are being enhanced by the thoughtful application of Bayes' theorem. The contributions contained in this volume present a state-of-the-art review that will be influential and useful for many years to come.

Data Theory and Dimensional Analysis

The modeling of economic phenomena and processes, in terms of their static and dynamic features and with regard to the characteristics of their course, is a major methodological trend in studies of the nature, properties and functioning of contemporary management systems. Models describing management systems must be of a multi-aspect nature, entailing aspects such as technical, economic and sociological factors on the one hand, and forecasting, planning, leading,

controlling etc., on the other. Developing a method for incorporating such diverse data into a system of analysis is, needless to say, a complex process. Dimensional analysis is a tool which might be useful in this process, but one which, up to now, has been little explored in the economic sciences. This book explores the application of dimensional analysis in the field of economics. It has been structured in a way which corresponds to the formulation of economic quantities, and is divided into five sections: measuring of economic quantities, modeling of economic processes, principles of dimensional analysis, building of quantified dimensional models, and experiment and practical verification.

Application of Dimensional Analysis in Economics

An introduction to dimensional analysis, a method of scientific analysis used to investigate and simplify complex physical phenomena, demonstrated through a series of engaging examples. This book offers an introduction to dimensional analysis, a powerful method of scientific analysis used to investigate and simplify complex physical phenomena. The method enables bold approximations and the generation of testable hypotheses. The book explains these analyses through a series of entertaining applications; students will learn to analyze, for example, the limits of world-record weight lifters, the distance an electric submarine can travel, how an upside-down pendulum is similar to a running velociraptor, and the number of Olympic rowers required to double boat speed. The book introduces the

approach through easy-to-follow, step-by-step methods that show how to identify the essential variables describing a complex problem; explore the dimensions of the problem and recast it to reduce complexity; leverage physical insights and experimental observations to further reduce complexity; form testable scientific hypotheses; combine experiments and analysis to solve a problem; and collapse and present experimental measurements in a compact form. Each chapter ends with a summary and problems for students to solve. Taken together, the analyses and examples demonstrate the value of dimensional analysis and provide guidance on how to combine and enhance dimensional analysis with physical insights. The book can be used by undergraduate students in physics, engineering, chemistry, biology, sports science, and astronomy.

Dimensional Analysis

The essays gathered in this volume contain analyses based on the general action perspective of Chicago sociology and, in particular, on the contributions of Anselm L. Strauss, whose lengthy achievement this volume honors.

Dimensional Analysis and Group Theory in Astrophysics

This book deals with the modeling of food processing using dimensional analysis.

When coupled to experiments and to the theory of similarity, dimensional analysis is indeed a generic, powerful and rigorous tool making it possible to understand and model complex processes for design, scale-up and /or optimization purposes. This book presents the theoretical basis of dimensional analysis with a step by step detail of the framework for applying dimensional analysis, with chapters respectively dedicated to the extension of dimensional analysis to changing physical properties and to the use of dimensional analysis as a tool for scaling-up processes. It includes several original examples issued from the research works of the authors in the food engineering field, illustrating the conceptual approaches presented and strengthen the teaching of all. Discusses popular dimensional analysis for knowledge and scaling-up tools with detailed case studies Emphasises the processes dealing with complex materials of a multiphase nature Introduces the concept of chemical or material similarity and a framework for analysis of the functional forms of the propoerty

Further Engineering Dynamics

Dimensional Analysis and Physical Similarity are well understood subjects, and the general concepts of dynamical similarity are explained in this book. Our exposition is essentially different from those available in the literature, although it follows the general ideas known as Pi Theorem. There are many excellent books that one can refer to; however, dimensional analysis goes beyond Pi theorem, which is also

known as Buckingham's Pi Theorem. Many techniques via self-similar solutions can bound solutions to problems that seem intractable. A time-developing phenomenon is called self-similar if the spatial distributions of its properties at different points in time can be obtained from one another by a similarity transformation, and identifying one of the independent variables as time. However, this is where Dimensional Analysis goes beyond Pi Theorem into self-similarity, which has represented progress for researchers. In recent years there has been a surge of interest in self-similar solutions of the First and Second kind. Such solutions are not newly discovered; they have been identified and named by Zel'dovich, a famous Russian Mathematician in 1956. They have been used in the context of a variety of problems, such as shock waves in gas dynamics, and filtration through elasto-plastic materials. Self-Similarity has simplified computations and the representation of the properties of phenomena under investigation. It handles experimental data, reduces what would be a random cloud of empirical points to lie on a single curve or surface, and constructs procedures that are self-similar. Variables can be specifically chosen for the calculations.

Dimensional Analysis

This ground-breaking reference provides an overview of key concepts in dimensional analysis, and then pushes well beyond traditional applications in fluid mechanics to demonstrate how powerful this tool can be in solving complex

problems across many diverse fields. Of particular interest is the book's coverage of dimensional analysis and self-similarity methods in nuclear and energy engineering. Numerous practical examples of dimensional problems are presented throughout, allowing readers to link the book's theoretical explanations and step-by-step mathematical solutions to practical implementations.

An Introduction to Infinite-Dimensional Analysis

Contemporary Chemical Process Engineers face complex design and research problems. Temperature-dependent physical properties and non-Newtonian flow behavior of substances in a process cannot be predicted by numerical mathematics. Scaling-up equipment for processing can often only be done with partial similarity methods. Standard textbooks often neglect topics like dimensional analysis, theory of similarity and scale-up. This book fills this gap! It is aimed both at university students and the process engineer. It presents dimensional analysis very comprehensively with illustrative examples of mechanical, thermal and chemical processes.

Dimensional Analysis and Intelligent Experimentation

Data Theory and Dimensional Analysis

Practical Guides in Chemical Engineering are a cluster of short texts that each provides a focused introductory view on a single subject. The full library spans the main topics in the chemical process industries that engineering professionals require a basic understanding of. They are ‘pocket publications’ that the professional engineer can easily carry with them or access electronically while working. Each text is highly practical and applied, and presents first principles for engineers who need to get up to speed in a new area fast. The focused facts provided in each guide will help you converse with experts in the field, attempt your own initial troubleshooting, check calculations, and solve rudimentary problems. Dimensional Analysis provides the foundation for similitude and for up and downscaling. Aeronautical, Civil, and Mechanical Engineering have used Dimensional Analysis profitably for over one hundred years. Chemical Engineering has made limited use of it due to the complexity of chemical processes. However, Chemical Engineering can now employ Dimensional Analysis widely due to the free-for-use matrix calculators now available on the Internet. This book shows how to apply matrices to Dimensional Analysis. Practical, short, concise information on the basics will help you get an answer or teach yourself a new topic quickly Supported by industry examples to help you solve a real world problem Single subject volumes provide key facts for professionals

A First Course in Dimensional Analysis

This Is A Reference Book For All Branches Of Engineering Students, Scientists, And Designers Alike. It Was Mainly Conceived To Introduce Conversion Of Units From One System Of Measurements To Another And To Teach The Principles Of Dimensional Analysis And Similitude. It Teaches How To Do Systematic Calculations Arriving At Dimensionless Products Pertaining To A Physical Phenomenon. An Algebraic Perspective Of Dimensional Analysis Has Also Been Presented To Clarify The Theoretical Implications. The Methods Of Similitude And Model Testing Have Finally Been Explained In Detail In A Practical Context.It Teaches The Subject Through About 132 Solved Problems Divided Into Five Chapters Covering All Aspects To Dimensional Analysis And Similitude. Each Basic Principle, Method And Theory Has Been Presented With Examples, Which Can Be Easily Understood By The Reader. The Solved Problems Serve To Understand The Importance Of Selecting Pertinent Variables To Analyze Any Phenomenon. It Also Helps To Illustrate And Clarify The Theory On Dimensional Analysis And Similitude.

Spectral methods in infinite-dimensional analysis. 1 (1995)

This book deals with a non-traditional exposition of dimensional analysis, physical similarity theory and general theory of scaling phenomena.

Dimensional Analysis

This introduction to dimensional analysis covers the methods, history and formalisation of the field, and provides physics and engineering applications. Covering topics from mechanics, hydro- and electrodynamics to thermal and quantum physics, it illustrates the possibilities and limitations of dimensional analysis. Introducing basic physics and fluid engineering topics through the mathematical methods of dimensional analysis, this book is perfect for students in physics, engineering and mathematics. Explaining potentially unfamiliar concepts such as viscosity and diffusivity, the text includes worked examples and end-of-chapter problems with answers provided in an accompanying appendix, which help make it ideal for self-study. Long-standing methodological problems arising in popular presentations of dimensional analysis are also identified and solved, making the book a useful text for advanced students and professionals.

Dimensional Analysis and Group Theory in Astrophysics

By examining some of the basic scaling questions, such as the importance of measurement levels, the kinds of variables needed for Likert or Guttman scales and when to use multidimensional scaling versus factor analysis, Jacoby introduces readers to the most appropriate scaling strategies for different research situations.

He also explores data theory, the study of how real world observations can be transformed into something to be analyzed, in order to facilitate more effective use of scaling techniques.

A Study of Dimensional Analysis

This modern approach integrates classical and contemporary methods, fusing theory and practice and bridging the gap to statistical learning.

University Physics

Similarity and Dimensional Methods in Mechanics provides a complete development of the basic concepts of dimensional analysis and similarity methods, illustrated by applications to a wide variety of problems in mechanics. This book shows the power of dimensional and similarity methods in solving problems in the theory of explosions and astrophysics. Organized into five chapters, this book begins with an overview of the fundamental ideas behind similarity and dimensional methods. This text then provides a series of examples of application of the methods. Other chapters consider the use of similarity and dimensional analysis in developing fundamental contributions to viscous fluid theory. This book discusses as well the various theories of isotropic turbulence. The final chapter

deals with the applications to the theory of the luminosity and internal structure of stars. This book is a valuable resource for students who wish to learn dimensional analysis and similarity methods for the first time. Readers who are connected with the many aspects of gas dynamics, including space technology, astrophysics, and atomic energy will also find this book useful.

Dimensional Analysis and Theory of Models

Applied Dimensional Analysis and Modeling provides the full mathematical background and step-by-step procedures for employing dimensional analyses, along with a wide range of applications to problems in engineering and applied science, such as fluid dynamics, heat flow, electromagnetics, astronomy and economics. This new edition offers additional worked-out examples in mechanics, physics, geometry, hydrodynamics, and biometry. Covers 4 essential aspects and applications: principal characteristics of dimensional systems, applications of dimensional techniques in engineering, mathematics and geometry, applications in biosciences, biometry and economics, applications in astronomy and physics Offers more than 250 worked-out examples and problems with solutions Provides detailed descriptions of techniques of both dimensional analysis and dimensional modeling

Dimensional Analysis

Recent Developments in Infinite-Dimensional Analysis and Quantum Probability

Applied Dimensional Analysis and Modeling

Dimensional Analysis and Group Theory in Astrophysics describes how dimensional analysis, refined by mathematical regularity hypotheses, can be applied to purely qualitative physical assumptions. The book focuses on the continuous spectral of the stars and the mass-luminosity relationship. The text discusses the technique of dimensional analysis, covering both relativistic phenomena and the stellar systems. The book also explains the fundamental conclusion of dimensional analysis, wherein the unknown functions shall be given certain specified forms. The Wien and Stefan-Boltzmann Laws can be significant in the systematic application of dimensional analysis to the physics of a single star. The text also discusses group-theoretical reduction of ordinary differential equations and the reductions of the differential equations of stellar structure. The structure of a stellar envelope requires three hypotheses: (1) thermo-nuclear reactions as source of energy of stellar; (2) thermo-nuclear reactions occur at the star's core; and (3) that an envelope surrounding the core exists where no radiation is generated. To complete

the model of a star, the investigator should have further assumptions such as the pressure is made-up of gas, radiation, or both. The book can prove helpful for astronomers, astro-physicists, cosmologists, and students of general physics.

A Student's Guide to Dimensional Analysis

Dimensional Analysis of Food Processes

The Russian edition of this book appeared 5 years ago. Since that time, many results have been improved upon and new approaches to the problems investigated in the book have appeared. But the greatest surprise for us was to discover that there exists a large group of mathematicians working in the area of the so-called White Noise Analysis which is closely connected with the essential part of our book, namely, with the theory of generalized functions of infinitely many variables. The first papers dealing with White Noise Analysis were written by T. Hida in Japan in 1975. Later, this analysis was devel oped intensively in Japan, Germany, U.S.A., Taipei, and in other places. The related problems of infinite-dimensional analysis have been studied in Kiev since 1967, and the theory of generalized functions of infinitely many variables has been in vestigated since 1973. However, due to the political system in the U.S.S.R., contact be tween

Ukrainian and foreign mathematicians was impossible for a long period of time. This is why, to our great regret, only at the end of 1988 did one of the authors meet L. Streit who told him about the existence of White Noise Analysis. And it become clear that many results in these two theories coincide and that, in fact, there exists a single theory and not two distinct ones.

ROMANCE ACTION & ADVENTURE MYSTERY & THRILLER BIOGRAPHIES & HISTORY CHILDREN'S YOUNG ADULT FANTASY HISTORICAL FICTION HORROR LITERARY FICTION NON-FICTION SCIENCE FICTION