Applied Metrology For Manufacturing Engineering

This book is the first of a series of volumes that cover the topic of aerospace actuators following a systems-based approach. This first volume provides general information on actuators and their reliability, and focuses on hydraulically supplied actuators. Emphasis is put on hydraulic power actuators as a technology that is used extensively for all aircraft, including newer aircraft. Currently, takeovers by major corporations of smaller companies in this field is threatening the expertise of aerospace hydraulics and has inevitably led to a loss of expertise. Further removal of hydraulics teaching in engineering degrees means there is a need to capitalize efforts in this field in order to move it forward as a means of providing safer, greener, cheaper and faster aerospace services. The topics covered in this set of books constitute a significant source of information for individuals and engineers seeking to learn more about aerospace hydraulics.

This book is dedicated to the description and application of various different theoretical models to identify the near and mid-infrared spectra of symmetric and spherical top molecules in their gaseous form. Theoretical models based on the use of group theory are applied to rigid and non-rigid molecules, characterized by the phenomenon of tunneling and large amplitude motions. The calculation of vibration-rotation energy levels and the analysis of infrared transitions are applied to molecules of ammonia (NH_3) and methane (CH_4). The applications show how interactions at the molecular scale modify the near and mid-infrared spectra of isolated molecules, under the influence of the pressure of a nano-cage (the substitution site of a rare gas matrix, clathrate, fullerene or zeolite) or a surface, and allow us to identify the characteristics of the perturbing environment. This book provides valuable support for teachers and researchers but is also intended for engineering students, working research engineers and Masters and doctorate students.

This book introduces an original fractional calculus methodology (the infinite state approach) which is applied to the modeling of fractional order differential equations (FDEs) and systems (FDSs). Its modeling is based on the frequency distributed fractional integrator, while the resulting model corresponds to an integer order and infinite dimension state space representation. This original modeling allows the theoretical concepts of integer order systems to be generalized to fractional systems, with a particular emphasis on a convolution formulation. With this approach, fundamental issues such as system state interpretation and system initialization – long considered to be major theoretical pitfalls – have been solved easily. Although originally introduced for numerical simulation and identification of FDEs, this approach also provides original solutions to many problems such as the initial conditions of fractional derivatives, the uniqueness of FDS transients, formulation of analytical transients, fractional differentiation of functions, state observation and control, definition of fractional energy, and Lyapunov stability analysis of linear and nonlinear fractional order systems. This second volume focuses on the initialization, observation and control of the distributed state, followed by stability analysis of fractional differential systems.

The objective of the book is to provide all the elements to evaluate the performance of production availability and reliability of a system, to integrate them and to manage them in its life cycle. By the examples provided (case studies) the main target audience is that of the petroleum industries (where I spent most of my professional years). Although the greatest rigor is applied in the presentation, and justification, concepts, methods and data this book is geared towards the user.

This book covers various modern theoretical, technical, practical and technological aspects of computerized numerical control and control systems of deterministic and stochastic dynamical processes.

Digital technology opens up extraordinary fields for applications that will deeply change the nature of jobs and trade, the very concept of work and the expectations of user–producers. The "masters of algorithms" have disrupted production and services, and this trend will continue for as long as electric energy and the elements of Industry 4.0 are in continued development. Beyond data control, a power struggle is working its way through the links in the value chain: intermediation, control of resources and command over human and physical networks, as well as partnerships, creativity and the political system. Industry 4.0: Paradoxes and Conflicts examines the need for a serious and technological review, as well as for research and training regarding citizenship and politics. This is a new situation in terms of relationships of competence and authority, which must be the subject of scientific as well as political reflections for the whole social body, which needs to be educated about choices. Throughout the book, the author poses the following question: instead of submitting to choices, would it not be better to exercise foresight?

A vital tool for researchers, engineers, and students, New Sensors and Processing Chain focuses on the processing chain to set up in order to extract relevant information on various systems. Highlighting the design of new microsensors and various applications, the authors present recent progress in instrumentation and microsystem design, providing insight to the modification of the sensor itself as well as its environment. Various applications illustrate the presentations, which show how a processing chain is organized from the data acquired by a specific sensor.

Nowadays approximately 6 billion people use a mobile phone and they now take a central position within our daily lives. The 1990s saw a tremendous increase in the use of wireless systems and the democratization of this means of communication. To allow the communication of millions of phones, computers and, more recently, tablets to be connected, millions of access points and base station antennas have been extensively deployed. Small cells and the Internet of Things with the billions of connected objects will reinforce this trend. This growing use of wireless communications has been accompanied by a perception of risk to the public from exposure to radio frequency (RF) electromagnetic field (EMF). To address this concern, biomedical research has been conducted. It has also been important to develop and improve dosimetry methods and protocols that could be used to evaluate EMF exposure and check compliance with health limits. To achieve this, much effort has was made in the 1990s and 2000s. Experimental and numerical methods, including statistical methods, have been developed. This book provides an overview and description of the basic and advanced methods that have been developed for human RF exposure assessment. It covers experimental, numerical, deterministic and stochastic methods.

This book focuses on industrial constraints such as subcontracting, warranty, and quality in manufacturing and logistic fields and gives new integrated maintenance strategies. It presents new production and maintenance Control Policies compared to the Hedging Point theory Strategy and different integrated strategies of maintenance are developed under industrial constraints in order to propose a robustness production and maintenance plan.

Near field communication (NFC) can appear to be a simple intuitive technology for exchanging data between close devices. In reality, these contactless structures that combine components and antennas must respect important and specific working constraints. Illustrated by a number of detailed technological examples, this book discusses the multiple normative (ISO, CEN, NFC Forum, EMVCo, etc.) and regulatory (ERC, FCC, ETSI, radiofrequency, private and ecological pollution, etc.) constraints, as well as the applied, typological, functional, structural, environmental or interoperability constraints that a NFC device might face. Design Constraints for NFC Devices also presents techniques that enable us to free ourselves from the technological constraints of current NFC operations encountered in banking, public transport, administration, automotive, industrial,

communicating object and Internet of Things applications.

This second book of a 3-volume set on Fracture Mechanics completes the first volume through the analysis of adjustment tests suited to correctly validating the justified use of the laws conforming to the behavior of the materials and structures under study. This volume focuses on the vast range of statistical distributions encountered in reliability. Its aim is to run statistical measurements, to present a report on enhanced measures in mechanical reliability and to evaluate the reliability of repairable or unrepairable systems. To achieve this, the author presents a theoretical and practice-based approach on the following themes: criteria of failures; Bayesian applied probability; Markov chains; Monte Carlo simulation as well as many other solved case studies. This book distinguishes itself from other works in the field through its originality in presenting an educational approach which aims at helping practitioners both in academia and industry. It is intended for technicians, engineers, designers, students, and teachers working in the fields of engineering and vocational education. The main objective of the author is to provide an assessment of indicators of quality and reliability to aid in decision-making. To this end, an intuitive and practical approach, based on mathematical rigor, is recommended.

Volume 1 presents successively an introduction followed by 10 chapters and a conclusion: - A logistic approach - an overview of operations research - The basics of graph theory - calculating optimal routes - Dynamic programming - planning and scheduling with PERT and MPM; - the waves of calculations in a network; - spanning trees and touring; - linear programming - modeling of road traffic

This book proposal for the "instrumentation & measurement" collection of ISTE-Wiley is devoted to special techniques in digital holography. The co-authors aim at establishing a synthetic stat-of-the-art of important advances in the field of digital holography. We are interested in detailing advances related to fundamentals of digital holography, in-line holography applied to fluid mechanics, digital color holography, digital holographic microscopy, infrared holography, special techniques in full field vibrometry and inverse problems in digital holography. This book presents advanced techniques in the field of digital holography. The book is organized in 8 chapters. The fist chapter introduces the basic fundamentals of digital holography. Chapter 2 discusses about the use of in-line holography to the study of seeded flows; the recent developments permit to apply this technique in many industrial or laboratory situations for velocimetry, particle size measurement or trajectography. Chapter 3 presents the new perspectives in 3-color holography applied to solid mechanics and fluid mechanics. Especially, a comparison between Michelson interferometer and interferometer using Wollaston prisms will be discussed. Chapter 4 is devoted to special techniques in holographic microscopy, with use of partial spatially coherent light sources; the use of a reduced coherence source is of interest for reducing the measurement noise; typical applications are detailed. Chapter 5 is devoted to applications of holographic microscopy in neurosciences. Chapter 6 presents digital holography in the infrared domain. Technology related to sensors and light sources are presented and digital holographic infrared interferometry is detailed and applied to high amplitude displacements of industrial aeronautic structures. Examples in NDT (non destructive testing) are also provided. Chapter 7 of the book, aims at presenting new techniques in the field of vibration measurement; especially, techniques based on high speed and ultimate sensitivity are described. Examples related to life sciences are discussed. Chapter 8 discusses about inverse problems in digital holography and demonstrates how a priori knowledge can be used to recover full information of the object scene even when recording is sparse.

Whether you are an engineer considering certification, or a non-engineer seeking to communicate more intelligently about manufacturing-related issues, Fundamentals of Manufacturing provides virtually all the information you need to know. The book is based singularly on SME's certification Institute's 'Body of Knowledge.' Fifteen manufacturing experts, including educators, practitioners in the field, subject matter specialists, have checked the content for relevancy, accuracy and clarity, guaranteeing focused self-study and solid answers to questions regarding the fundamentals. Features: Thorough review of manufacturing fundamentals with samples and practice problems; Detailed table of contents and index; Referencing feature provides quick access to figures, tables, equations, problems and solutions; Mathematical equations, newly reformatted, are arranged logically according to the sequence they're presented; Includes a number key to practice problems; Up-to-date with current theoretical models, notably lean manufacturing. Benefits: Increased knowledge of manufacturing engineering and what is covered on the Fundamentals of Manufacturing Certification Examination; Example questions and problems prepare you for real-world situations; Great reference. Specific Information is logically enumerated, so it's easy to find; Orderly presentation and layout makes for good retention and enjoyable reading.

This book addresses the preparation and application of design layout analyses with concurrent engineering teams in six steps that capture design intent and add value to design process. It offers tools for eliminating costly trial-and-error approaches and deliver economically viable products. The authors discuss product design techniques that allevi

This book is dedicated to the application of the different theoretical models described in Volume 1 to identify the near-, mid- and far-infrared spectra of linear and nonlinear triatomic molecules in gaseous phase or subjected to environmental constraints, useful for the study of environmental sciences, planetology and astrophysics. The Van Vleck contact transformation method, described in Volume 1, is applied in the calculation and analysis of IR transitions between vibration–rotation energy levels. The extended Lakhlifi–Dahoo substitution model is used in the framework of Liouville's formalism and the line profiles of triatomic molecules and their isotopologues subjected to environmental constraints are calculated by applying the cumulant expansion. The applications presented in this book show how interactions at the molecular level modify the infrared spectra of triatomics trapped in a nano-cage (substitution site of a rare gas matrix, clathrate, fullerene, zeolite) or adsorbed on a surface, and how these interactions may be used to identify

the characteristics of the perturbing environment.

In 1984, additive manufacturing represented a new methodology for manipulating matter, consisting of harnessing materials and/or energy to create three-dimensional physical objects. Today, additive manufacturing technologies represent a market of around 5 billion euros per year, with an annual growth between 20 and 30%. Different processes, materials and dimensions (from nanometer to decameter) within additive manufacturing techniques have led to 70,000 publications on this topic and to several thousand patents with applications as wide-ranging as domestic uses. Volume 1 of this series of books presents these different technologies with illustrative industrial examples. In addition to the strengths of 3D methods, this book also covers their weaknesses and the developments envisaged in terms of incremental innovations to overcome them.

Volume 3 begins with an introduction to which are added four chapters focused on modeling and flow simulation in an environment in 2 or 3 dimensions (2D or 3D). They deal with different cases taken from situations found in the field. A conclusion comes close this third book: - The different software used in this third volume; - Computer simulation of discrete flows; - Mixed flow simulation; - Flows in 3D and the evacuation simulation; - Flows in 3D for conveying and storage The conclusion discusses the future developments of the software and their integration into society. At the end of each volume is a bibliography and a list of web links. There is also a glossary explaining some abbreviations, acronyms and some very specific terminology of logistics and operations research.

This handbook will provide engineers with the principles, applications, and solutions needed to design and manage semiconductor manufacturing operations. Consolidating the many complex fields of semiconductor fundamentals and manufacturing into one volume by deploying a team of world class specialists, it allows the quick look up of specific manufacturing reference data across many subdisciplines.

Urban logistics has been a subject of interest to researchers and practitioners for more than 20 years in France and Europe, and more than 40 in the United States. Nevertheless, the subject remains difficult to address by a lack of unification in the definitions and proposed methods but also by what makes its great richness: the diversity of actors and the pluridisciplinarity of the methods and techniques available. This book, which synthesizes more than 10 years of personal research on the subject, but also experience within different teams and projects, intends to bring a unified vision (and more and more followed at the international level) on logistics planning Urban development. It begins with an overview of research in urban logistics and then describes and defines the main components: flows, actors, infrastructures, management components, technologies, regulations and financing actions. A unified vision of these elements as well as the definition of sustainable urban logistics is proposed. Then, the book presents the basics of planning and managing sustainable urban logistics. First, the basics of the before-after analysis are introduced, not only for the experiments but also for the simulation of scenarios. To carry out this type of analysis, two main groups of methods are needed: methods for estimating flows and methods for calculating evaluation indicators. The book presents the main global standards and dominant models for the estimation of the urban freight transport demand, i.e. of freight transport needs in urban areas. Then it presents the methods for estimating and simulating transport and distribution schemes (i.e. transport supply) as well as a proposal for integrated supply-demand modeling. All these methods are presented for immediate application to practitioners, accompanied by summary tables and parameters necessary for their implementation. As far as evaluation is concerned, the book presents a framework for the choice of sustainable indicators and scorecards. Second, the main methods for economic, environmental, social and accessibility assessment are presented. They are accompanied by tables and figures necessary for their implementation. Finally, the main applications of the proposed methods are introduced. The book is meant to be a practical guide to applying the main methods from scientific research to a practical context, and presents examples of quantified and explained application. It is thus the first book that summarizes and presents the main unified methods to help the different decision-makers to implement them in their actions of planning and management of the urban logistics and the transport of goods in town.

The Wave Concept Iterative Procedure (WCIP) method has found an increasing number of users within electromagnetic theory and applications to planar circuits, antennas and diffraction problems. This book introduces in detail this new formulation of integral methods, based on the use of a wave concept with two bounded operators, and applications in a variety of domains in electromagnetics. This approach presents a number of benefits over other integral methods, including overcoming the problem of singularity, and reduced computing time. Through the presentation of mathematical equations to characterize studied structures and explanation of the curves obtained, via validated examples, the authors provide a thorough background to electromagnetism as well as a professional reference to students and researchers.

The aim of this handbook is to provide a comprehensive summary of sensing and measurement in precision manufacturing, which is essential for process and quality control. The importance of precision sensing and measurements lies not only in the ability to distinguish whether the manufactured part meets the assigned tolerances through inspection but also, in many cases, reduce the deviation of the manufactured part from the designed values through improvement of the process or compensation manufacturing based on the sensing and measurement results. The information provided in the book will be of interest to industrial practitioners and researchers in the field of precision manufacturing sensing and measurements. This volume is part of a handbook series that covers a comprehensive range of scientific and technological matters in 'Precision Manufacturing'.

Applied Metrology for Manufacturing Engineering, stands out from traditional works due to its educational aspect. Illustrated by tutorials and laboratory models, it is accessible to users of non-specialists in the fields of design and manufacturing. Chapters can be viewed independently of each other. This book focuses on technical geometric and dimensional tolerances as well as mechanical testing and quality control. It also provides references and solved examples to help professionals and teachers to adapt their models to specific cases. It reflects recent developments in ISO and GPS standards and focuses on training that goes hand in hand with the progress of practical work and workshops dealing with measurement and dimensioning.

Quantum mechanics is the foundation of modern technology, due to its innumerable applications in physics, chemistry and even biology. This second volume studies Schrödingers equation and its applications in the study of wells, steps and potential barriers. It examines the properties of orthonormal bases in the space of square-summable wave functions and Dirac notations in the space of states. This book has a special focus on the notions of the linear operators, the Hermitian operators, observables, Hermitian conjugation, commutators and the representation of

kets, bras and operators in the space of states. The eigenvalue equation, the characteristic equation and the evolution equation of the mean value of an observable are introduced. The book goes on to investigate the study of conservative systems through the time evolution operator and Ehrenfests theorem. Finally, this second volume is completed by the introduction of the notions of quantum wire, quantum wells of semiconductor materials and quantum dots in the appendices.

The application of Bayesian Networks (BN) or Dynamic Bayesian Networks (DBN) in dependability and risk analysis is a recent development. A large number of scientific publications show the interest in the applications of BN in this field. Unfortunately, this modeling formalism is not fully accepted in the industry. The questions facing today's engineers are focused on the validity of BN models and the resulting estimates. Indeed, a BN model is not based on a specific semantic in dependability but offers a general formalism for modeling problems under uncertainty. This book explains the principles of knowledge structuration to ensure a valid BN and DBN model and illustrate the flexibility and efficiency of these representations in dependability, risk analysis and control of multi-state systems and dynamic systems. Across five chapters, the authors present several modeling methods and industrial applications are referenced for illustration in real industrial contexts.

This Special Issue of the Manufacturing Engineering Society 2019 (SIMES-2019) has been launched as a joint issue of the journals Applied Sciences and Materials. The 10 contributions published in this Special Issue of Applied Sciences present cutting-edge advances in the field of manufacturing engineering, focusing on production planning, sustainability, metrology, cultural heritage, and materials processing, with experimental and numerical results. It is worth mentioning that the topic "production planning" has attracted a great number of contributions in this journal, due to their applicative approach.

This book is the second in a series of volumes which cover the topic of aerospace actuators following a systems-based approach. This second volume brings an original, functional and architectural vision to more electric aerospace actuators. The aspects of signal (Signal-by-Wire) and power (Power-by-Wire) are treated from the point of view of needs, their evolution throughout history, and operational solutions that are in service or in development. This volume is based on an extensive bibliography, numerous supporting examples and orders of magnitude which refer to flight controls and landing gear for various aircraft (fixed or rotorwing, launchers) in commercial, private and military applications. The topics covered in this set of books constitute a significant source of information for individuals and engineers from a variety of disciplines, seeking to learn more about aerospace actuation systems and components.

This book is the third in a series dedicated to aerospace actuators. It uses the contributions of the first two volumes to conduct case studies on actuation for flight controls, landing gear and engines. The actuation systems are seen in several aspects: signal and power architectures, generation and distribution of hydraulic or mechanical power, control and reliability, and evolution towards more electrical systems. The first three chapters are dedicated to the European commercial airplanes that marked their era: Caravelle, Concorde, Airbus A320 and Airbus A380. The final chapter deals with the flight controls of the Boeing V-22 and AgustaWestland AW609 tiltrotor aircraft. These address concerns that also apply to electromechanical actuators, which should be fitted on more electrical aircraft in the future. The topics covered in this series of books constitute a significant source of information for individuals and engineers from a variety of disciplines, seeking to learn more about aerospace actuation systems and components.

The Vlasov equation is the master equation which provides a statistical description for the collective behavior of large numbers of charged particles in mutual, long-range interaction. In other words, a low collision (or "Vlasov") plasma. Plasma physics is itself a relatively young discipline, whose "birth" can be ascribed to the 1920s. The origin of the Vlasov model, however, is even more recent, dating back to the late 1940s. This "young age" is due to the rare occurrence of Vlasov plasma on Earth, despite the fact it characterizes most of the visible matter in the universe. This book – addressed to students, young researchers and to whoever wants a good understanding of Vlasov plasmas – discusses this model with a pedagogical presentation, focusing on the general properties and historical development of the applications of the Vlasov equation. The milestone developments discussed in the first two chapters serve as an introduction to more recent works (characterization of wave propagation and nonlinear properties of the electrostatic limit).

Metrology and Instrumentation: Practical Applications for Engineering and Manufacturing provides students and professionals with an accessible foundation in the metrology techniques, instruments, and governing standards used in mechanical engineering and manufacturing. The book opens with an overview of metrology units and scale, then moves on to explain topics such as sources of error, calibration systems, uncertainty, and dimensional, mechanical, and thermodynamic measurement systems. A chapter on tolerance stack-ups covers GD&T, ASME Y14.5-2018, and the ISO standard for general tolerances, while a chapter on digital measurements connects metrology to newer, Industry 4.0 applications.

The book has a dual purpose. The first is to expose a general methodology to solve problems of electromagnetism in geometries constituted of angular regions. The second is to bring the solutions of some canonical problems of fundamental importance in modern electromagnetic engineering with the use of the Wiener-Hopf technique. In particular, the general mathematical methodology is very ingenious and original. It is based on sophisticated and attractive procedures exploiting simple and advanced properties of analytical functions. Once the reader has acquired the methodology, she/he can easily obtain the solution of the canonical problems reported in the book. The book can be appealing also to readers who are not directly interested in the detailed mathematical methodology and/ or in electromagnetics. In fact the same methodology can be extended to acoustics and

elasticity problems. Moreover, the proposed practical problems with their solutions constitute a list of reference solutions and can be of interests in engineering production in the field of radio propagations, electromagnetic compatibility and radar technologies.

The first part of the book defines the concept of uncertainties and the mathematical frameworks that will be used for uncertainty modeling. The application to system reliability assessment illustrates the concept. In the second part, evidential networks as a new tool to model uncertainty in reliability and risk analysis is proposed and described. Then it is applied on SIS performance assessment and in risk analysis of a heat sink. In the third part, Bayesian and evidential networks are used to deal with important measures evaluation in the context of uncertainties.

This first book of a 3-volume set on Fracture Mechanics is mainly centered on the vast range of the laws of statistical distributions encountered in various scientific and technical fields. These laws are indispensable in understanding the probability behavior of components and mechanical structures that are exploited in the other volumes of this series, which are dedicated to reliability and quality control. The author presents not only the laws of distribution of various models but also the tests of adequacy suited to confirm or counter the hypothesis of the law in question, namely the Pearson (x2) test, the Kolmogorov-Smirnov (KS) test, along with many other relevant tests. This book distinguishes itself from other works in the field through its originality in presenting an educational approach which aims at helping practitioners both in academia and industry. It is intended for technicians, engineers, designers, students, and teachers working in the fields of engineering and vocational education. The main objective of the author is to provide an assessment of indicators of quality and reliability to aid in decision-making. To this end, an intuitive and practical approach, based on mathematical rigor, is recommended.

How to manage the cybersecurity of industrial systems is a crucial question. To implement relevant solutions, the industrial manager must have a clear understanding of IT systems, of communication networks and of control-command systems. They must also have some knowledge of the methods used by attackers, of the standards and regulations involved and of the available security solutions. Cybersecurity of Industrial Systems presents these different subjects in order to give an in-depth overview and to help the reader manage the cybersecurity of their installation. The book addresses these issues for both classic SCADA architecture systems and Industrial Internet of Things (IIoT) systems.

This book is the result of lessons, tutorials and other laboratories dealing with applied mechanical design in the universities and colleges. In the classical literature of the mechanical design, there are quite a few books that deal directly and theory and case studies, with their solutions. All schools, engineering colleges (technical) industrial and research laboratories and design offices serve design works. However, the books on the market remain tight in the sense that they are often works of mechanical constructions. This is certainly beneficial to the ordinary user, but the organizational part of the functional specification items is also indispensable.

Building Information Modeling (BIM) is the digital and graphical representation of the physical and functional characteristics of a structure. It provides a reliable basis for decisions throughout a building's lifecycle, and with BIM it is possible to design, plan, build and track projects. In particular, BIM has sparked a transformation of the railway sector. Railway Information Modeling RIM is a compilation of two years' worth of academic, conceptual and practical research on the integration of BIM into railway. It summarizes and focuses on a survey carried out by the authors, who are experts in the field. The book also contains a literature review and a case study to demonstrate the benefits and sustainability of BIM integration, and finishes with the practical steps and considerations for the successful management of the integration process.

The integration and use of information and communication technologies (ICT) in African countries is increasingly observable in various sectors of activity (banking, education, trade, etc.) despite a digital divide still relevant. ICT has become a major sector of the recent growth of a new informal economy in African cities (Chéneau-Loquay, 2008). This question has been at the heart of various international meetings. An overall positive and even utopian momentum is generally heard about the contribution of digital technologies to the development of African states. The adoption or appropriation of digital technologies by Africans is presented in many speeches by politicians or institutions involved in the field of cooperation and international development as an important issue for the development of this continent. These different considerations give rise to reflections on the following themes. - Social Media and Public Space in Africa - Challenges of the digital economy in Africa - ICT and modernization of higher education in Africa

For decades performers, instrumentalists, composers, technicians and sound engineers continue to manipulate sound material. They are trying with more or less success to create, to innovate, improve, enhance, restore or modify the musical message. The sound of distorted guitar of Jimi Hendrix, Pierre Henry's concrete music, Pink Flyod's rock psychedelic, Kraftwerk 's electronic music, Daft Punk and rap T-Pain, have let emerge many effects: reverb, compression, distortion, auto-tune, filter, chorus, phasing, etc. The aim of this book is to introduce and explain these effects and sound treatments by addressing their theoretical and practical aspects.