

Wind Effects On Structures Fundamentals And Applications To Design

Design of Buildings and Bridges for Wind is a practical guide that uses physical and intuitive approaches, and practical examples, to demonstrate how to interpret and use provisions of the ASCE-7 Standard and design structures for strength and serviceability. Written by two of the world's foremost wind engineering experts, this unique text is written specifically for designers and structural engineers. Covering routine buildings, tall buildings, and bridges, Design of Buildings and Bridges for Wind contains a wealth of step-by-step numerical examples to assist structural engineers in understanding and using the elements of wind and structural engineering required for design. This hands-on guide features:

- * Information on how to determine design wind loads and wind effects for both routine and special structures
- * Information allowing structural engineers to effectively scrutinize estimates of wind effects submitted by wind engineering consultants
- * Clear, transparent procedures for developing estimates of wind effects based on aerodynamic data supplied in electronic form by wind tunnel operators
- * Access to wind speed databases and software for determining wind

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effects on rigid and flexible structures (nist.gov/wind)

Large-scale wind power generation is one of the fastest developing sources of renewable energy and already makes a substantial contribution to power grids in many countries worldwide. With technology maturing, the challenge is now to increase penetration, and optimise the design, construction and performance of wind energy systems. Fundamental issues of safety and reliability are paramount in this drive to increase capacity and efficiency. Wind energy systems: Optimising design and construction for safe and reliable operation provides a comprehensive review of the latest developments in the design, construction and operation of large-scale wind energy systems, including in offshore and other problematic environments. Part one provides detailed coverage of wind resource assessment and siting methods relevant to wind turbine and wind farm planning, as well as aeroelastics, aerodynamics, and fatigue loading that affect the safety and reliability of wind energy systems. This coverage is extended in part two, where the design and development of individual components is considered in depth, from wind turbine rotors to drive train and control systems, and on to tower design and construction. Part three explores operation and maintenance issues, such as reliability and maintainability strategies and condition monitoring systems, before discussing performance assessment and optimisation routes for

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wind energy systems in low wind speed environments and cold climates. Part four reviews offshore wind energy systems development, from the impact of environmental loads such as wind, waves and ice, to site specific construction and integrated wind farm planning, and of course the critical issues and strategies for offshore operation and maintenance. With its distinguished editors and international teams of contributors, Wind energy systems is a standard reference for wind power engineers, technicians and manufacturers, as well as researchers and academics involved in this expanding field. Reviews the latest developments in the design, construction and operation of large-scale wind energy systems Offers detailed coverage of wind resource assessment and siting methods relevant to wind turbine and wind farm planning Explores operation and maintenance issues, such as reliability and maintainability strategies and condition monitoring systems

This report introduces the basic tools and technology used by engineers to determine the effects of wind on city streets and structures.

Slender structures, such as towers, masts, high-rise buildings and bridges, are especially prone to wind excited vibrations. The lectures show how the susceptibility of a structure to wind excited vibrations can be assessed in early stages of design and what measures are effective for control or avoidance of

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vibrations. The book will be a help for all dealing with dynamic response of structures.

This book offers a comprehensive introduction to the theory of structural dynamics, highlighting practical issues and illustrating applications with a large number of worked out examples. In the spirit of “learning by doing” it encourages readers to apply immediately these methods by means of the software provided, allowing them to become familiar with the broad field of structural dynamics in the process. The book is primarily focused on practical applications. Earthquake resistant design is presented in a holistic manner, discussing both the underlying geophysical concepts and the latest engineering design methods and illustrated by fully worked out examples based on the newest structural codes. The spectral characteristics of turbulent wind processes and the main analysis methods in the field of structural oscillations due to wind gusts and vortex shedding are also discussed and applications illustrated by realistic examples of slender chimney structures. The user-friendly software employed is downloadable and can be readily used by readers to tackle their own problems.

This book serves as a textbook for advanced courses as it introduces state-of-the-art information and the latest research results on diverse problems in the structural wind engineering field. The topics include wind climates, design wind

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speed estimation, bluff body aerodynamics and applications, wind-induced building responses, wind, gust factor approach, wind loads on components and cladding, debris impacts, wind loading codes and standards, computational tools and computational fluid dynamics techniques, habitability to building vibrations, damping in buildings, and suppression of wind-induced vibrations. Graduate students and expert engineers will find the book especially interesting and relevant to their research and work.

Written by seven internationally known experts, the articles in this book present the fundamentals and practical applications of contemporary wind engineering. It covers complex problems in wind-building interaction from the perspective of a structural designer, examining both experimental and computational approaches and their relative merits.

Copies are supplied by TSO's on-demand publishing service

A brand-new edition of the classic guide on low-speed wind tunnel testing While great advances in theoretical and computational methods have been made in recent years, low-speed wind tunnel testing remains essential for obtaining the full range of data needed to guide detailed design decisions for many practical engineering problems. This long-awaited Third Edition of William H. Rae, Jr.'s landmark reference brings together essential information on all aspects of low-speed wind tunnel design, analysis,

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testing, and instrumentation in one easy-to-use resource. Written by authors who are among the most respected wind tunnel engineers in the world, this edition has been updated to address current topics and applications, and includes coverage of digital electronics, new instrumentation, video and photographic methods, pressure-sensitive paint, and liquid crystal-based measurement methods. The book is organized for quick access to topics of interest, and examines basic test techniques and objectives of modeling and testing aircraft designs in low-speed wind tunnels, as well as applications to fluid motion analysis, automobiles, marine vessels, buildings, bridges, and other structures subject to wind loading. Supplemented with real-world examples throughout, *Low-Speed Wind Tunnel Testing, Third Edition* is an indispensable resource for aerospace engineering students and professionals, engineers and researchers in the automotive industries, wind tunnel designers, architects, and others who need to get the most from low-speed wind tunnel technology and experiments in their work.

Since the 1960s, wind tunnel testing has become a commonly used tool in the design of tall buildings. It was pioneered, in large part, during the design of the World Trade Center Towers in New York. Since those early days of wind engineering, wind tunnel testing techniques have developed in sophistication, but these techniques are not widely understood by the designers using the results. As a direct result, the CTBUH Wind Engineering Working Group was formed to develop a concise guide for the non-specialist. The primary goal of this guide is to provide an overview of the wind tunnel

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testing process for design professionals. This knowledge allows readers to ask the correct questions of their wind engineering consultants throughout the design process. This is not an in-depth guide to the technical intricacies of wind tunnel testing, it focusses instead on the information the design community needs, including: a unique methodology for the presentation of wind tunnel results to allow straightforward comparison of results from different wind tunnel laboratories. advice on when a tall building is likely to be sufficiently sensitive to wind effects to benefit from a wind tunnel test background for assessing whether design codes and standards are applicable details of the types of tests that are commonly conducted descriptions of the fundamentals of wind climate and the interaction of wind and tall buildings This unique book is an essential guide for all designers of tall buildings, and anyone else interested in the process of wind tunnel testing for tall buildings.

If one surveys the development of wind engineering, one comes to the conclusion that the challenge of urban climatology is one of the most important remaining tasks for the wind engineers. But what distinguishes wind engineering in urban areas from conventional wind engineering? Principally, the fact that the effects studied are usually unique to a particular situation, requiring consideration of the surroundings of the buildings. In the past, modelling criteria have been developed that make it possible to solve environmental problems with great confidence, and studies validated the models: at least in a neutrally stratified atmosphere. The approach adopted in the book is that of

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applied fluid mechanics, since this forms the basis for the evaluation of the urban wind field. Variables for air quality or loads are problem specific, or even random, and methods for studying them are based on risk analysis, which is also presented. Criteria are developed for a systematic approach to urban wind engineering problems, including parameter studies. The five sections of the book are: Fundamentals of urban boundary layer and dispersion; Forces on complex structures in built-up areas; Air pollution in cities; Numerical solution techniques; and Posters. A subject index is included.

Bridging the gap between wind and structural engineering, *Wind Loading of Structures* is essential reading for practising civil, structural and mechanical engineers, and graduate students of wind engineering, presenting the principles of wind engineering and providing guidance on the successful design of structures for wind loading by gales, hurricanes, typhoons, thunderstorm downdrafts and tornados.

This updated textbook provides a balanced, seamless treatment of both classic, analytic methods and contemporary, computer-based techniques for conceptualizing and designing a structure. New to the second edition are treatments of geometrically nonlinear analysis and limit analysis based on nonlinear inelastic analysis. Illustrative examples of nonlinear behavior generated with advanced software are included. The book fosters an intuitive understanding of structural behavior based on problem solving experience for students of civil engineering and architecture who have been exposed to the basic concepts of engineering mechanics and mechanics of materials. Distinct from

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other undergraduate textbooks, the authors of *Fundamentals of Structural Engineering, 2/e* embrace the notion that engineers reason about behavior using simple models and intuition they acquire through problem solving. The perspective adopted in this text therefore develops this type of intuition by presenting extensive, realistic problems and case studies together with computer simulation, allowing for rapid exploration of how a structure responds to changes in geometry and physical parameters. The integrated approach employed in *Fundamentals of Structural Engineering, 2/e* make it an ideal instructional resource for students and a comprehensive, authoritative reference for practitioners of civil and structural engineering.

This book focuses on the physics of wind and its impact on the buildings and towers. This book provides an essential overview of wind science and engineering, taking readers on a journey through the origins, developments, fundamentals, recent advancements and latest trends in this broad field. Along the way, it addresses a diverse range of topics, including: atmospheric physics; meteorology; micrometeorology; climatology; the aerodynamics of buildings, aircraft, sailing boats, road vehicles and trains; wind energy; atmospheric pollution; soil erosion; snow drift, windbreaks and crops; bioclimatic city-planning and architecture; wind actions and effects on structures; and wind hazards, vulnerability and risk. In order to provide a comprehensive overview of wind and its manifold effects, the book combines scientific, descriptive and narrative chapters. The book is chiefly intended for students and

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lecturers, for those who want to learn about the genesis and evolution of this topic, and for the multitude of scholars whose work involves the wind.

ASCE/SEI 49-21 provides the minimum requirements for conducting and interpreting wind tunnel tests to determine wind loads on buildings and other structures.

Recent advances in the development of high strength materials, coupled with more advanced computational methods and design procedures, have led to a new generation of tall and slender buildings. These structures are very sensitive to the most common dynamic loads; wind and earthquakes. The primary requirement for a successful design is to provide safety while taking into account serviceability requirements. This book provides a well-balanced and broad coverage of the information needed for the design of structural systems for wind- and earthquake-resistant buildings. It covers topics such as the basic concepts in structural dynamics and structural systems, the assessment of wind and earthquake loads acting on the system, the evaluation of the system response to such dynamic loads and the design for extreme loading. The text is generously illustrated and supported by numerical examples and will be of great interest to practising engineers and researchers in structural, civil and design engineering and also to architects. The author has drawn on his experience as a teacher, researcher and consultant.

Wind Effects on Structures Modern Structural Design for Wind Wiley-Blackwell

Comprehensive reference covering the design of foundations for offshore wind turbines

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As the demand for “green” energy increases the offshore wind power industry is expanding at a rapid pace around the world. *Design of Foundations for Offshore Wind Turbines* is a comprehensive reference which covers the design of foundations for offshore wind turbines, and includes examples and case studies. It provides an overview of a wind farm and a wind turbine structure, and examines the different types of loads on the offshore wind turbine structure. Foundation design considerations and the necessary calculations are also covered. The geotechnical site investigation and soil behavior/soil structure interaction are discussed, and the final chapter takes a case study of a wind turbine and demonstrates how to carry out step by step calculations. Key features: New, important subject to the industry. Includes calculations and case studies. Accompanied by a website hosting software and data files. *Design of Foundations for Offshore Wind Turbines* is a must have reference for engineers within the renewable energy industry and is also a useful guide for graduate students in this area.

This book provides detailed information on the design of wind resistant structures. It includes material on building code provisions for wind loads on low rise buildings. It provides engineers with up-to-date methods and standards for the construction of wind-resistant structures and reflects the increased use of instrumentation and computers to predict structural loading and the creation of more stringent building codes.

Wind power plants teaches the physical foundations of usage of Wind Power. It

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includes the areas like Construction of Wind Power Plants, Design, Development of Production Series, Control, and discusses the dynamic forces acting on the systems as well as the power conversion and its connection to the distribution system. The book is written for graduate students, practitioners and inquisitive readers of any kind. It is based on lectures held at several universities. Its German version it already is the standard text book for courses on Wind Energy Engineering but serves also as reference for practising engineers.

A vital resource for pilots, instructors, and students, from the most trusted source of aeronautic information.

ASCE 7 is the US standard for identifying minimum design loads for buildings and other structures. ASCE 7 covers many load types, of which wind is one. The purpose of this book is to provide structural and architectural engineers with the practical state-of-the-art knowledge and tools needed for designing and retrofitting buildings for wind loads. The book will also cover wind-induced loss estimation. This new edition include a guide to the thoroughly revised, 2010 version of the ASCE 7 Standard provisions for wind loads; incorporate major advances achieved in recent years in the design of tall buildings for wind; present material on retrofitting and loss estimation; and improve the presentation of the material to increase its usefulness to structural engineers. Key features: New focus on tall buildings helps make the analysis and design guidance easier and less complex. Covers the new simplified design methods of ASCE 7-10,

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guiding designers to clearly understand the spirit and letter of the provisions and use the design methods with confidence and ease. Includes new coverage of retrofitting for wind load resistance and loss estimation from hurricane winds. Thoroughly revised and updated to conform with current practice and research.

The brand-new edition—with complete, up-to-date coverage of new methods and standards for the construction of wind-resistant structures Long recognized as the sole source of detailed information on the design of wind-resistant structures, *Wind Effects on Structures* equips designers and engineers with crucial knowledge concerning the atmosphere, the forces placed on a structure by the wind environment, and the behavior of structures under the action of these forces. Revised, updated, and augmented with material on new building codes, engineering practices, and technology, this latest edition is the most comprehensive and up-to-the-minute reference available on this important subject. New features include: Special material on the design of low-rise buildings, including building code provisions for wind loads on these structures Technical information on hurricane micrometeorology, computational fluid dynamics, empirical aerolastic models, and many other areas Easy-to-use software package for the automatic calculation of wind loads in accordance with ASCE Standard 7-95, and much more The damage done by recent hurricanes such as Andrew and Iniki has inspired a number of significant developments in the wind engineering field, from increased use of technology to predict structural loading to the creation of more

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stringent building codes. Long recognized as the sole source of detailed information on the design of wind-resistant structures, *Wind Effects on Structures* has now been fully revised to address these important changes—providing engineers with completely up-to-date methods and standards for the construction of wind-resistant structures. Divided into sections on the atmosphere, wind loads, and their effects on structures, the text now incorporates the latest information on the design of low-rise buildings, revised building code standards, and suspended-span structures, plus new material on an extensive range of technical subjects—including across-wind and torsional effects on tall structures, damping of flexible buildings, and progress in wind tunnel modeling.

Combining fundamental concepts with real-world applications, this new edition features an easy-to-use software package that enables fast and accurate calculation of wind loads in line with ASCE Standard 7-95 provisions. Thoroughly updated, revised, and amended, *Wind Effects on Structures* provides the invaluable guidance designers and engineers need to assure the adequate structural safety and serviceability of virtually any wind-sensitive project.

Written by an experienced practitioner of fabric structure design, this book methodically addresses all aspects of the design and construction process. Structural engineers will gain an understanding of shaping, analysis, and design of members and connections; architects will learn the possibilities and limitations in fabric roof form, as well as the means of achieving successful energy, lighting, acoustical, and fire safety performance; the contractors will gain invaluable information related to their fabrication and erection.

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Wind energy's bestselling textbook- fully revised. This must-have second edition includes up-to-date data, diagrams, illustrations and thorough new material on: the fundamentals of wind turbine aerodynamics; wind turbine testing and modelling; wind turbine design standards; offshore wind energy; special purpose applications, such as energy storage and fuel production. Fifty additional homework problems and a new appendix on data processing make this comprehensive edition perfect for engineering students. This book offers a complete examination of one of the most promising sources of renewable energy and is a great introduction to this cross-disciplinary field for practising engineers. "provides a wealth of information and is an excellent reference book for people interested in the subject of wind energy." (IEEE Power & Energy Magazine, November/December 2003) "deserves a place in the library of every university and college where renewable energy is taught." (The International Journal of Electrical Engineering Education, Vol.41, No.2 April 2004) "a very comprehensive and well-organized treatment of the current status of wind power." (Choice, Vol. 40, No. 4, December 2002)

This 1995 book presents a detailed description of factors affecting the design of optical processing and interconnection systems.

Provides structural engineers with the knowledge and practical tools needed to perform structural designs for wind that incorporate major technological, conceptual, analytical and computational advances achieved in the last two decades. With clear explanations and documentation of the concepts, methods, algorithms, and software available for accounting for wind loads in structural design, it also describes the wind engineer's contributions in sufficient detail that they can be effectively scrutinized by the structural engineer in charge of the design.

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Wind Effects on Structures: Modern Structural Design for Wind, 4th Edition is organized in four sections. The first covers atmospheric flows, extreme wind speeds, and bluff body aerodynamics. The second examines the design of buildings, and includes chapters on aerodynamic loads; dynamic and effective wind-induced loads; wind effects with specified MRIs; low-rise buildings; tall buildings; and more. The third part is devoted to aeroelastic effects, and covers both fundamentals and applications. The last part considers other structures and special topics such as trussed frameworks; offshore structures; and tornado effects. Offering readers the knowledge and practical tools needed to develop structural designs for wind loadings, this book: Points out significant limitations in the design of buildings based on such techniques as the high-frequency force balance Discusses powerful algorithms, tools, and software needed for the effective design for wind, and provides numerous examples of application Discusses techniques applicable to structures other than buildings, including stacks and suspended-span bridges Features several appendices on Elements of Probability and Statistics; Peaks-over-Threshold Poisson-Process Procedure for Estimating Peaks; estimates of the WTC Towers' Response to Wind and their shortcomings; and more Wind Effects on Structures: Modern Structural Design for Wind, 4th Edition is an excellent text for structural engineers, wind engineers, and structural engineering students and faculty. Calculate structural loads in compliance with the 2018 IBC® and ASCE/SEI 7-16 This practical guide shows, step by step, how to interpret and apply the load provisions contained in the 2018 IBC® and ASCE/SEI 7-16. You will learn how to accurately determine structural loads including dead loads, live loads, and environmental loads. Throughout the book, detailed design examples, unique flowcharts, and design aids illustrate the proper usage of the code

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within the scope of everyday practice. Coverage includes:

- Structural load fundamentals
- IBC® and ASCE 7 explanations
- Load combinations
- Dead, live, rain, and soil lateral loads
- Snow and ice loads
- Wind loads
- Earthquake loads
- Flood and tsunami loads
- Load paths

Dynamics of Structural Dynamics explains foundational concepts and principles surrounding the theory of vibrations and gives equations of motion for complex systems. The book presents classical vibration theory in a clear and systematic way, detailing original work on vehicle-bridge interactions and wind effects on bridges. Chapters give an overview of structural vibrations, including how to formulate equations of motion, vibration analysis of a single-degree-of-freedom system, a multi-degree-of-freedom system, and a continuous system, the approximate calculation of natural frequencies and modal shapes, and step-by-step integration methods. Each chapter includes extensive practical examples and problems. This volume presents the foundational knowledge engineers need to understand and work with structural vibrations, also including the latest contributions of a globally leading research group on vehicle-bridge interactions and wind effects on bridges. Explains the foundational concepts needed to understand structural vibrations in high-speed railways Gives the latest research from a leading group working on vehicle-bridge interactions and wind effects on bridges Lays out routine procedures for generating dynamic property matrices in MATLAB® Presents a novel principle and rule to help researchers model time-varying systems Offers an efficient solution for readers looking to understand basic concepts and methods in vibration analysis

Wind Turbines addresses all those professionally involved in research, development, manufacture and operation of wind turbines. It provides a cross-disciplinary overview of modern wind turbine technology and an orientation in the associated technical, economic and

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environmental fields. It is based on the author's experience gained over decades designing wind energy converters with a major industrial manufacturer and, more recently, in technical consulting and in the planning of large wind park installations, with special attention to economics. The second edition accounts for the emerging concerns over increasing numbers of installed wind turbines. In particular, an important new chapter has been added which deals with offshore wind utilisation. All advanced chapters have been extensively revised and in some cases considerably extended

Global economic losses due to severe weather events have grown dramatically over the past two decades. A large proportion of these losses are due to severe wind storms such as tropical cyclones and tornadoes, which can cause destruction to buildings, houses, and other infrastructure over large areas. To address the growing losses, many new large-scale and full-scale laboratories have been developed. These tools are used to examine the issues that could not be solved with the traditional tools of wind engineering including model-scale boundary layer wind tunnels, simplified standardized product tests, and other methods of analysis. This book presents state-of-the-art results from the development of the many novel approaches being used to mitigate natural disasters around the world.

The Earth's Ionosphere: Plasma Physics and Electrodynamics emphasizes the study of plasma physics and electrodynamics of the ionosphere, including many aeronomical influences. The ionosphere is somewhat of a battleground between the earth's neutral atmosphere and the sun's fully ionized atmosphere, in which the earth is embedded. One of the challenges of ionosphere research is to know

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enough about these two vast fields of research to make sense out of ionospheric phenomena. This book provides insights into how these competing sources of mass, momentum, and energy compete for control of the ionosphere. Some of the topics discussed include the fundamentals of ionospheric plasma dynamics; equatorial plasma instabilities; high-latitude electrodynamics; and instabilities and structure in the high-latitude ionosphere. Throughout this text only the region above 90 km are discussed, ignoring the D region entirely. This publication is a good source of information for students and individuals conducting research on earth's ionosphere.

Growing energy demand and environmental consciousness have re-evoked human interest in wind energy. As a result, wind is the fastest growing energy source in the world today. Policy frame works and action plans have already been for- lated at various corners for meeting at least 20 per cent of the global energy - mand with new-renewables by 2010, among which wind is going to be the major player. In view of the rapid growth of wind industry, Universities, all around the world, have given due emphasis to wind energy technology in their undergraduate and graduate curriculum. These academic programmes attract students from diver- fied backgrounds, ranging from social science to engineering and technology. Fundamentals of wind energy conversion, which is discussed in

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the preliminary chapters of this book, have these students as the target group. Advanced resource analysis tools derived and applied are beneficial to academics and researchers working in this area. The Wind Energy Resource Analysis (WERA) software, provided with the book, is an effective tool for wind energy practitioners for - sassing the energy potential and simulating turbine performance at prospective sites.

This guideline defines ventilation and then natural ventilation. It explores the design requirements for natural ventilation in the context of infection control, describing the basic principles of design, construction, operation and maintenance for an effective natural ventilation system to control infection in health-care settings.

This book presents selected articles from the 5th International Conference on Geotechnics, Civil Engineering Works and Structures, held in Ha Noi, focusing on the theme “Innovation for Sustainable Infrastructure”, aiming to not only raise awareness of the vital importance of sustainability in infrastructure development but to also highlight the essential roles of innovation and technology in planning and building sustainable infrastructure. It provides an international platform for researchers, practitioners, policymakers and entrepreneurs to present their recent advances and to exchange knowledge and experience on various topics

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related to the theme of “Innovation for Sustainable Infrastructure”.

Geotechnical Fundamentals and Applications in Construction. New Materials, Structures, Technologies and Calculations contains the papers presented at the International Conference on Geotechnical Fundamentals and Applications in Construction. New Materials, Structures, Technologies and Calculations (GFAC 2019, Saint Petersburg, Russia, 6-8 February 2019). The contributions present the latest research findings, developments, and applications in the areas of geotechnics, soil mechanics, foundations, geological engineering and share experiences in the design of complex geotechnical objects, and are grouped in 8 sections:

- Analytical decisions and numerical modeling for foundations;
- Design and construction in geologically hazardous conditions;
- Methods for surveying the features of dispersed, rocky soils and structurally unstable soils;
- Exploration, territory improvement and reconstruction in conditions of compact urban planning and enterprises, etc.;
- Construction, reconstruction and exploitation of infrastructure facilities in different soil conditions;
- R&D support and quality control of new materials, design and technology solutions in constructing bases, foundations, underground and surface constructions;
- Condition survey and accident evolution analysis in construction;
- Up-to-date monitoring techniques in building construction and exploitation.

Geotechnical

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Fundamentals and Applications in Construction. New Materials, Structures, Technologies and Calculations collects the state-of-the-art in geotechnology and construction, and will be of interest to academia and professionals in geotechnics, soil mechanics, foundation engineering and geological engineering.

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