

Technology Innovation In Underground Construction

Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art contains the contributions presented at the World Tunnel Congress 2019 (Naples, Italy, 3-9 May 2019). The use of underground space is continuing to grow, due to global urbanization, public demand for efficient transportation, and energy saving, production and distribution. The growing need for space at ground level, along with its continuous value increase and the challenges of energy saving and achieving sustainable development objectives, demand greater and better use of the underground space to ensure that it supports sustainable, resilient and more liveable cities. This vision was the source of inspiration for the design of the logos of both the International (ITA) and Italian (SIG) Tunnelling Association. By placing key infrastructures underground – the black circle in the logos – it will be possible to preserve and enhance the quality of the space at ground level – the green line. In order to consider and value underground space usage together with human and social needs, engineers, architects, and artists will have to learn to collaborate and develop an interdisciplinary design approach that addresses functionality, safety, aesthetics and quality of life, and adaptability to future and varied functions. The 700 contributions cover a wide range of topics, from more traditional subjects connected to technical challenges of design and construction of underground works, with emphasis on innovation in tunneling engineering, to less conventional and archetypically Italian themes such as archaeology, architecture, and art. The book has the following main themes: Archaeology, Architecture and Art in underground construction; Environment sustainability in underground construction; Geological and geotechnical knowledge and requirements for project implementation; Ground improvement in underground constructions; Innovation in underground engineering, materials and equipment; Long and deep tunnels; Public communication and awareness; Risk management, contracts and financial aspects; Safety in underground construction; Strategic use of underground space for resilient cities; Urban tunnels. Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art is a valuable reference text for tunneling specialists, owners, engineers, architects and others involved in underground planning, design and building around the world, and for academics who are interested in underground constructions and geotechnics.

Life-Cycle Civil Engineering contains the papers presented at the First International Symposium on Life-Cycle Civil Engineering (IALCCE 08), held in Villa Monastero, Varenna, Lake Como, Italy, 10-14 June, 2008. It consists of a book and a CD-ROM containing 150 papers, including eight keynote papers and 142 technical contributions from 28 countries.

For thousands of years, the underground has provided humans refuge, useful resources, physical support for surface structures, and a place for spiritual or artistic expression. More recently, many urban services have been placed underground. Over this time, humans have rarely considered how underground space can contribute to or be engineered to maximize its contribution to the sustainability of society. As human activities begin to change the planet and population struggle to maintain satisfactory standards of living, placing new infrastructure and related facilities underground may be the most successful way to encourage or support the redirection of urban development into sustainable patterns. Well maintained, resilient, and adequately performing underground infrastructure, therefore, becomes an essential part of sustainability, but much remains to be learned about improving the sustainability of underground infrastructure itself. At the request of the National Science Foundation (NSF), the National Research Council (NRC) conducted a study to consider sustainable underground development in the urban environment, to identify research needed to maximize opportunities for using underground space, and to enhance understanding among the public and technical communities of the role of underground engineering in urban sustainability. Underground Engineering for Sustainable Urban Development explains the findings of researchers and practitioners with expertise in geotechnical engineering, underground design and construction, trenchless technologies, risk assessment, visualization techniques for geotechnical applications, sustainable infrastructure development, life cycle assessment, infrastructure policy and planning, and fire prevention, safety and ventilation in the underground. This report is intended to inform a future research track and will be of interest to a broad audience including those in the private and public sectors engaged in urban and facility planning and design, underground construction, and safety and security.

The proceedings collect the latest research trends, methods and experimental results in the field of electrical and information technologies for rail transportation. The topics cover intelligent computing, information processing, communication technology, automatic control, and their applications in rail transportation etc. The proceedings can be a valuable reference work for researchers and graduate students working in rail transportation, electrical engineering and information technologies.

The Shanghai Yangtze River Tunnel. Theory, Design and Construction

Proceedings of the 26th Joint Meeting of the U.S.-Japan Cooperative Program in Natural Resources Panel on Wind and Seismic Effects

Proceedings of the 1st International Conference (ICITG) Shanghai

Innovation in Underground Engineering

Geotechnical Aspects of Underground Construction in Soft Ground

Nanotechnology in Construction

This book discusses the introduction of isogeometric technology to the boundary element method (BEM) in order to establish an improved link between simulation and computer aided design (CAD) that does not require mesh generation. In the isogeometric BEM, non-uniform rational B-splines replace the Lagrange polynomials used in conventional BEM. This may seem a trivial exercise, but if implemented rigorously, it has profound implications for the programming, resulting in software that is extremely user friendly and efficient. The BEM is ideally suited for linking with CAD, as both rely on the definition of objects by boundary representation. The book shows how the isogeometric philosophy can be implemented and how its benefits can be maximised with a minimum of user effort. Using several examples, ranging from potential problems to elasticity, it demonstrates that the isogeometric approach results in a drastic reduction in the number of unknowns and an increase in the quality of the results. In some cases even exact solutions without refinement are possible. The book also presents a number of practical applications, demonstrating that the development is not only of academic interest. It then elegantly addresses heterogeneous and non-linear problems using isogeometric concepts, and tests them on several examples, including a severely non-linear problem in viscous flow. The book makes a significant contribution towards a seamless integration of CAD and simulation, which eliminates the need for tedious mesh generation and provides high-quality results with minimum user intervention and computing.

This volume comprises three keynote lectures by internationally well-known experts in the field of underground construction, the inaugural Fujita lecture to honor professor Keiichi Fujita, and the regular papers presented at the 8th International Symposium on Geotechnical Aspects of Underground Construction in Soft Ground (IS-Seoul 2014). Topics

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In the past ten years there was a worldwide trend towards increased use of Tunnel Boring Machines (TBM's). This trend covers a broad variety of applications ranging both from small diameters for sewers and other utilities to large diameters

for double track railway and even three-lane highway tunnels. The response to this has been the development of both hard rock machines in the direction for application in soft ground, and soft ground TBM's to be used in soft rock. Parallel to the technical development of TBM's towards applications for longer tunnels, running through changing geological conditions, there are needs for the development of lining methods. 'TBM Tunnel Trends' an international lecture serie collection, aims to present the latest scientific and practical state of the art of TBM tunnelling, taking into consideration interactions between machinery and lining. 26 international highly recognized papers.

This book proposes the tool change methods for the excessive tool wear in the construction rules of shield tunnel construction in China. From the perspective of shield tunneling, atmospheric pressure tool change, pressure opening and tool change, and other special techniques, the tool change technologies are proposed. It highlights a number of tool-changing techniques and research and development work, including pressure-changing tools, tool-changing tools in the tool-cylinder arm, and cutter-tooth cutter inter-change since the beginning of the construction of the Nanjing Yangtze River Tunnel.

Fifth European Workshop on Structural Health Monitoring 2010

Innovative Production And Construction: Transforming Construction Through Emerging Technologies

Tunnels and Underground Cities: Engineering and Innovation Meet Archaeology, Architecture and Art

Handbook on Tunnels and Underground Works

ECPPM 2008

Shield Tunneling Technology in Hard-Soft Uneven Stratum and Extremely-Soft Stratum

This book contains papers, presented at the ITA World Tunnelling Congress 2003 held in Amsterdam, which reflects the state of the art with regard to research, analysis, design and practical experience in almost all fields of tunnelling and underground space construction.

Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art contains the contributions presented at the World Tunnel Congress 2019 (Naples, Italy, 3-9 May 2019). The use of underground space is continuing to grow, due to global urbanization, public demand for efficient transportation, and energy saving, production and distribution. The growing need for space at ground level, along with its continuous value increase and the challenges of energy saving and achieving sustainable development objectives, demand greater and better use of the underground space to ensure that it supports sustainable, resilient and more liveable cities. This vision was the source of inspiration for the design of the logos of both the International (ITA) and Italian (SIG) Tunnelling Association. By placing key infrastructures underground - the black circle in the logos - it will be possible to preserve and enhance the quality of the space at ground level - the green line. In order to consider and value underground space usage together with human and social needs, engineers, architects, and artists will have to learn to collaborate and develop an interdisciplinary design approach that addresses functionality, safety, aesthetics and quality of life, and adaptability to future and varied functions. The 700 contributions cover a wide range of topics, from more traditional subjects connected to technical challenges of design and construction of underground works, with emphasis on innovation in tunneling engineering, to less conventional and archetypically Italian themes such as archaeology, architecture, and art. The book has the following main themes: Archaeology, Architecture and Art in underground construction; Environment sustainability in underground construction; Geological and geotechnical knowledge and requirements for project implementation; Ground improvement in underground constructions; Innovation in underground engineering, materials and equipment; Long and deep tunnels; Public communication and awareness; Risk management, contracts and financial aspects; Safety in underground construction; Strategic use of underground space for resilient cities; Urban tunnels. Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art is a valuable reference text for tunneling specialists, owners, engineers, architects and others involved in underground planning, design and building around the world, and for academics who are interested in underground constructions and geotechnics.

Throughout the 38 chapters, this must-have volume outlines essential information about the implementation of emerging technologies, from building information modeling and 3D printing, to life cycle assessment and information technology in construction and engineering projects. It covers practical case studies to demonstrate the implementation of emerging technologies in a compact style, ensuring that practitioners can adopt these methods to realize immediate benefits in productivity, safety and performance improvement.

This volume presents a selection of chapters covering a wide range of tunneling engineering topics. The scope was to present reviews of established methods and new approaches in construction practice and in digital technology tools like building information modeling. The book is divided in four sections dealing with geological aspects of tunneling, analysis and design, new challenges in tunnel construction, and tunneling in the digital era. Topics from site investigation and rock mass failure mechanisms, analysis and design approaches, and innovations in tunnel construction through digital tools are covered in 10 chapters. The references provided will be useful for further reading.

Oil and the Future of Energy

Tunnels and Underground Cities

Participation and the Quality of Environmental Decision Making

Wind and Seismic Effects

Opportunities for Research and Technological Innovation

Volume 2: Construction – Methods, Equipment, Tools and Materials

Innovation and Application of Engineering Technology contains the proceeding of International Symposium of Engineering Technology and Application Convocation (ISETA 2017, 25-28 May 2017, Montreal, Canada). The Symposium provided an international forum for discussion and communication of engineering technology and application of Civil and Environmental Engineering, Mining Engineering, Risk and Occupational Engineering and other fields related to engineering. Sponsored by

Concordia University, International Joint Research Laboratory of Henan Province for Underground Space Development, Henan Polytechnic University and IJSS, Innovation and Application of Engineering Technology will be useful for researchers, engineers and graduate and Ph.D. students in related Engineering fields.

It is clear that our society must become a more sustainable one. To that end, we must change both our production and our consumption patterns. Some argue that this implies the abolition of democratic processes, and thus of citizens' participation in environmental policy. Others argue the opposite: the only way to avoid impending environmental disaster is by engaging in common deliberation and contemplation. Is participation, then, a negative force or not? This volume is one of the first coordinated attempts to study the relationship between democratic, participatory forms of decision making and the quality of environmental decisions. The central question is how can the normatively desirable practice of participatory decision making be combined with an effective approach to environmental issues? Guided by a theoretical introduction by the editors, the 15 chapters deal with topics ranging from the scale of environmental problems, local agenda 21, infrastructural decisions, strategic planning, to environmental policy in developing countries. Three chapters are devoted to each of these broad themes. Each presents either a theoretical or an empirical argument about the central research question, shedding light on such issues as the measurement of decision quality, participation techniques, and the link between participation and decision quality, drawing on experience gained in Europe, North and South America, Asia, and Africa. The introductions to the individual parts of the book have been collectively written by the contributors, who represent a range of professional disciplines, including political science, public policy and planning.

The 3rd International Symposium on Nanotechnology in Construction (NICOM 3) follows the highly successful NICOM 1 (Paisley, UK 2003) and NICOM 2 (Bilbao, Spain 2005) Symposia. The NICOM3 symposium was held in Prague, Czech Republic from May 31 to June 2, 2009 under the auspices of the Czech Technical University in Prague. It was a cross-disciplinary event, bringing together R&D experts and users from different fields all with interest in nanotechnology and construction. The conference was aimed at: Understanding of internal structures of existing construction materials at nano-scale Modification at nano-scale of existing construction materials. Production and properties of nanoparticulate materials, nanotubes and novel polymers. Modeling and simulation of nanostructures. Instrumentation, techniques and metrology at nano-scale. Health and safety issues and environmental impacts related to nanotechnology during research, manufacture and product use. Review of current legislation. Societal and commercial impacts of nanotechnology in construction, their predictions and analysis.

Energy geostructures are a tremendous innovation in the field of foundation engineering and are spreading rapidly throughout the world. They allow the procurement of a renewable and clean source of energy which can be used for heating and cooling buildings. This technology couples the structural role of geostructures with the energy supply, using the principle of shallow geothermal energy. This book provides a sound basis in the challenging area of energy geostructures. The objective of this book is to supply the reader with an exhaustive overview on the most up-to-date and available knowledge of these structures. It details the procedures that are currently being applied in the regions where geostructures are being implemented. The book is divided into three parts, each of which is divided into chapters, and is written by the brightest engineers and researchers in the field. After an introduction to the technology as well as to the main effects induced by temperature variation on the geostructures, Part 1 is devoted to the physical modeling of energy geostructures, including in situ investigations, centrifuge testing and small-scale experiments. The second part includes numerical simulation results of energy piles, tunnels and bridge foundations, while also considering the implementation of such structures in different climatic areas. The final part concerns practical engineering aspects, from the delivery of energy geostructures through the development of design tools for their geotechnical dimensioning. The book concludes with a real case study. Contents Part 1. Physical Modeling of Energy Piles at Different Scales 1. Soil Response under Thermomechanical Conditions Imposed by Energy Geostructures, Alice Di Donna and Lyesse Laloui. 2. Full-scale In Situ Testing of Energy Piles, Thomas Mimouni and Lyesse Laloui. 3. Observed Response of Energy Geostructures, Peter Bourne-Webb. 4. Behavior of Heat-Exchanger Piles from Physical Modeling, Anh Minh Tang, Jean-Michel Pereira, Ghazi Hassen and Neda Yavari. 5. Centrifuge Modeling of Energy Foundations, John S. McCartney. Part 2. Numerical Modeling of Energy Geostructures 6. Alternative Uses of Heat-Exchanger Geostructures, Fabrice Dupray, Thomas Mimouni and Lyesse Laloui. 7. Numerical Analysis of the Bearing Capacity of Thermoactive Piles Under Cyclic Axial Loading, Maria E. Suryatriyastuti, Hussein Mroueh, Sébastien Burlon and Julien Habert. 8. Energy Geostructures in Unsaturated Soils, John S. McCartney, Charles J.R. Coccia, Nahed Alsherif and Melissa A. Stewart. 9. Energy Geostructures in Cooling-Dominated Climates, Ghassan Anis Akrouch, Marcelo Sanchez and Jean-Louis Briaud. 10. Impact of Transient Heat Diffusion of a Thermoactive Pile on the Surrounding Soil, Maria E. Suryatriyastuti, Hussein Mroueh and Sébastien Burlon. 11. Ground-Source Bridge Deck De-icing Systems Using Energy Foundations, C. Guney Olgun and G. Allen Bowers. Part 3. Engineering Practice 12. Delivery of Energy Geostructures, Peter Bourne-Webb with contributions from Tony Amis, Jean-Baptiste Bernard, Wolf Friedemann, Nico Von Der Hude, Norbert Pralle, Veli Matti Uotinen and Bernhard Widerin. 13. Thermo-Pile: A Numerical Tool for the Design of Energy Piles, Thomas Mimouni and Lyesse Laloui. 14. A Case Study: The Dock Midfield of Zurich Airport, Daniel Pahud. About the Authors Lyesse Laloui is Chair Professor, Head of the Soil Mechanics, Geoengineering and CO₂ storage Laboratory and Director of Civil Engineering at the Swiss Federal Institute of Technology (EPFL) in Lausanne, Switzerland. Alice Di Donna is a researcher at the Laboratory of Soil Mechanics at the Swiss Federal Institute of Technology (EPFL) in Lausanne, Switzerland.

Tunnel Boring Machines: Trends in Design and Construction of Mechanical Tunnelling

Three-Dimensional Exploration Technology of Tunnel Geology

Energy Geostructures

Proceedings of the NICOM3

Colombia 2022/23

Proceedings of the WTC 2019 ITA-AITES World Tunnel Congress (WTC 2019), May 3-9, 2019, Naples, Italy Since 1994, the European Conference on Product and Process Modelling (www.ecppm.org) has been providing a review of research, development and industrial implementation of product and process model technology in construction. The 7th European Conference on Product and Process Modelling (ECPPM 2008) provided a unique discussion platform for topics of

One of the world's currently largests tunnel projects is under construction at the Yangtze River estuary: the Shanghai Yangtze River Tunnel project, with its length of 8950 m and a diameter of 15.43 m. The Shanghai Yangtze River Tunnel. Theory, Design and Construction, which was presented

as a special issue at the occasion of the 6th International

This book includes nine chapters presenting the outcome of research projects relevant to building, cities, and construction. A description of a smart city and the journey from conventional to smart cities is discussed at the beginning of the book. Innovative case studies of underground cities and floating city bridges are presented in this book. BIM and GIS applications on different projects, and the concept of intelligent contract and virtual reality are discussed. Two concepts relevant to conventional buildings including private open spaces and place attachments are also included, and these topics can be upgraded in the future by smart technologies.

Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art. Volume 11: Urban Tunnels - Part 1 contains the contributions presented in the eponymous Technical Session during the World Tunnel Congress 2019 (Naples, Italy, 3-9 May 2019). The use of underground space is continuing to grow, due to global urbanization, public demand for efficient transportation, and energy saving, production and distribution. The growing need for space at ground level, along with its continuous value increase and the challenges of energy saving and achieving sustainable development objectives, demand greater and better use of the underground space to ensure that it supports sustainable, resilient and more liveable cities. The contributions cover a wide range of topics, from geomechanical behavior evaluation, evaluation of long-term tunnel behaviour, via monitoring excavation-related ground deformation to risk management for tunneling-induced deformations. The book is a valuable reference text for tunnelling specialists, owners, engineers, archaeologists, architects, artists and others involved in underground planning, design and building around the world, and for academics who are interested in underground constructions and geotechnics.

Shield Construction Techniques in Tunneling

Electrical Traction

Climate Repair * Hydrogen * Nuclear Fuel * Renewable And Green Sources * Energy Efficiency
NICOM 2, Bilbao, Spain, 13 - 16 November 2005

Proceedings of the international lecture series, Hagenberg Castle, Linz, 14-15 December 1995

Proceedings of the 2015 International Conference on Electrical and Information Technologies for Rail Transportation

This book explores innovation in the U.S. construction-related industries (i.e., design services, construction, building materials and products manufacture, and facilities operation and maintenance) and recommends a strategy for fostering new technology. These industries account for about ten percent of the U.S. economy; federal agencies themselves spend some \$15 billion annually on construction. A government strategy based on federal agencies that encourage applications of new technology for their own projects, activities to enhance the pursuit and effective transfer of new technology to the U.S. private sector, and increased support for targeted efforts to develop new technologies in specific areas will yield many benefits. These include better cost, quality, and performance in government facilities, generally improved quality of life, and enhanced U.S. industrial competitiveness in international markets.

The proceedings contain papers accepted for the 17th ISPE International Conference on Concurrent Engineering, which was held in Cracow, Poland, September 6-10, 2010.

Concurrent Engineering (CE) has a history of over twenty years. At first, primary focus was on bringing downstream information as much upstream as possible, by introducing parallel processing of processes, in order to prevent errors at the later stage which would sometimes cause irrevocable damage and to reduce time to market. During the period of more than twenty years, numerous new concepts, methodologies and tools have been developed. During this period the background for engineering/manufacturing has changed extensively. Now, industry has to work with global markets. The globalization brought forth a new network of experts and companies across many different domains and fields in distributed environments. These collaborations integrated with very high level of professionalism and specialisation, provided the basis for innovations in design and manufacturing and succeeded in creating new products on a global market.

The field of geoengineering is at a crossroads where the path to high-tech solutions meets the path to expanding applications of geotechnology. In this report, the term "geoengineering" includes all types of engineering that deal with Earth materials, such as geotechnical engineering, geological engineering, hydrological engineering, and Earth-related parts of petroleum engineering and mining engineering. The rapid expansion of nanotechnology, biotechnology, and information technology begs the question of how these new approaches might come to play in developing better solutions for geotechnological problems. This report presents a vision for the future of geotechnology aimed at National Science Foundation (NSF) program managers, the geological and geotechnical engineering community as a whole, and other interested parties, including Congress, federal and state agencies, industry, academia, and other stakeholders in geoengineering research. Some of

the ideas may be close to reality whereas others may turn out to be elusive, but they all present possibilities to strive for and potential goals for the future. Geoengineers are poised to expand their roles and lead in finding solutions for modern Earth systems problems, such as global change, emissions-free energy supply, global water supply, and urban systems.

Volume is indexed by Thomson Reuters CPCI-S (WoS). These are the proceedings of the 2nd International Conference on Automation, Communication, Architectonics and Materials (ACAM 2012), held on the 23rd and 24th June, 2012, in Hefei, China: an invaluable fund of original ideas and new visual angles on all aspects of Materials and Mechanics in Architectonics and Materials Engineering.

The Role of Public Agencies in Fostering New Technology and Innovation in Building Proceedings of the 17th ISPE International Conference on Concurrent Engineering

Life-Cycle Civil Engineering

Tunnel Engineering

Tunnels and Underground Structures: Proceedings Tunnels & Underground Structures, Singapore 2000

Technology Innovation in Underground Construction

The Business Year: Colombia 2022/23 is our 10th annual publication on the Colombian economy. Research carried out for this publication came as the region emerged from the worst of COVID-19 restrictions as the country elected its first-ever left-wing president. In this 200-page edition, which features interviews with top business leaders from across the economy, as well as news and analysis, we cover: green economy, finance, energy, mining, industry, telecoms and IT, transport, construction, real estate, agriculture, health, education, and tourism and entertainment.

This volume comprises a collection of four special lectures, six general reports and 112 papers presented at the Sixth International Symposium of Geotechnical Aspects of Underground Construction in Soft Ground (IS-Shanghai) held between 10 and 12 April 2008 in Shanghai, China. The Symposium was organised by Tongji University and the following t

This text describes topics discussed at the conference, including: tunnelling and construction in soft ground and rocks; geological investigations; tunnelling machines; planning for underground infrastructure; safety issues and environmental and social aspects of underground development.

This book focuses on some technical problems encountered in shield tunneling in hard-soft uneven stratum and extremely soft stratum, based on the recent shield tunneling engineering practice, and summarizes the achievements of shield tunneling in view of the technical problems from an overall and objective perspective. There are 6 chapters in this book. Chapter 1 introduces the development trend of shield tunneling method, defines classification of various stratum where shield tunneling applies, and mainly analyses the selection of shield machines and the configuration of cutters. Chapters 2 to 5 elaborates the strata characteristics and construction difficulties under various stratum conditions, puts forward adaptive selection and design keys of shield in various stratum, and emphatically analyses and summarizes the stability control technologies of shield tunnel face and driving control technology by case studies. Chapter 6 introduces the shield chamber opening technologies under hyperbaric condition, emphatically presents the basic requirements and operational preparations for the shield chamber opening, and puts forward innovative ideas of operation procedures, control points of key procedures, and safety requirements of shield chamber opening under hyperbaric condition.

Tunnels and Underground Cities. Engineering and Innovation Meet Archaeology, Architecture and Art Felsbau

Information Technology in Geo-engineering

Underground Engineering for Sustainable Urban Development

Geological and Geotechnical Engineering in the New Millennium

2nd International Symposium on Nanotechnology in Construction

Oil and the Future of Energy brings together the most important and accessible science writing on a topic of intense interest and concern. In addition to oil, writers cover carbon and climate change, hydrogen, nuclear power, conservation, renewable resources, transitional strategies, and visionaries in the field today. With their impeccable reputation for top science reporting, the editors of Scientific American present influential research and thinking from the most important scientists working with these burning global issues today. This one volume is an unparalleled resource for businesspeople, investors, and individuals who care about the planet.

Harmonising Rock Mechanics and the Environment comprises the proceedings (invited and contributed papers) of the ISRM International Congress on Rock Mechanics (Beijing, China, 18-21 October 2011). The contributions cover the entire scope of rock mechanics and rock engineering, with an emphasis on the critical role of both disciplines in sustainable

This book set provides a new, global, updated, thorough, clear, and practical risk-based approach to tunnelling design, construction methods, and discusses detailed examples of solutions applied to relevant case histories. It is organized into sequential and integrated volumes: Volume 1: Concept – Basic Principles of Design Volume 2: Construction – Methods, Equipment, Tools and Materials Volume 3: Case Histories and Best Practices The book covers all aspects of tunnelling, providing useful and practical information about design (Vol. 1), construction (Vol. 2), and best practices (Vol. 3). It provides the following features and benefits: updated vision on tunnelling design, tools, materials, and construction balanced mix of theory, technology, and applied experience different and harmonized points of view from academics, professionals, and contractors easy consultation in the form of a handbook risk-oriented approach to tunnelling problems. The tunnelling industry is amazingly widespread and increasingly important all over the world, particularly in developing countries. T

possible audience of the book are engineers, geologists, designers, constructors, providers, contractors, public and private customers, and, in general, technicians involved in the tunnelling and underground works industry. It is also a suitable source of information for industry professionals, senior undergraduate and graduate students, researchers, and academics. This richly-illustrated reference guide presents innovative techniques focused on reducing time, cost and risk in the construction and maintenance of underground facilities: A primary focus of the technological development in underground engineering is to ease the practical execution and to reduce time, cost and risk in the construction and maintenance of underground facilities such as tunnels and caverns. This can be realized by new design tools for designers, by instant access for engineers, by virtual prototyping and training for manufacturers, and by robotic devices for maintenance and repair for operators and many more advances. This volume presents the latest technological innovations in underground design, construction, and operation, and comprehensively discusses developments in ground improvement, simulation, process integration, safety, monitoring, environmental impact, equipment, boring and cutting, personnel training, materials, robotics and more. These new features are the result of a big research project on underground engineering, which has involved many players in the discipline. Written in an accessible style and with a focus on applied engineering, this book is aimed at a readership of engineers, consultants, contractors, operators, researchers, manufacturers, suppliers and clients of the underground engineering business. It may moreover be used as educational material for advanced courses in tunnelling and underground construction.

Selected Topics

Engineering and Innovation Meet Archaeology, Architecture and Art. Proceedings of the WTC 2019 ITA-AITES World Tunnel Congress (WTC 2019), May 3-9, 2019, Naples, Italy

The Isogeometric Boundary Element Method

Innovation and Application of Engineering Technology

Proceedings of the 6th International Symposium (IS-Shanghai 2008)

Volume 11: Urban Tunnels - Part 1

Shield Construction Techniques in Tunnelling presents the latest on this fast, environmentally-friendly and relatively safe construction technique, reflecting on its technical risks and challenges as seen in China. Sections introduce the type of shields, the history of the technique, shielding principles, selection, management, the latest techniques in operation, consider engineering cases, discuss construction in gravel, soft-soil, composite, and rock strata, and present video clips of construction that are accessible through QR codes embedded in the text. The book combines theory and practical experience, giving the reader unique insights into shield equipment and construction techniques. The shield tunneling technique is being used very widely, particularly in China, which is building urban-rail transit systems at an unparalleled scale and speed. The use of tunneling-shields provides a fast, relatively-safe, and ecologically-friendly method for the construction of tunnels. However, a number of incidents have shown the risks involved in tunnelling through geologically complex areas. Gives the principles and practice of shield construction techniques, including shield selection and operation Demonstrates the latest technologies in shield construction that can be applied in practice Reflects on the technical risks and challenges of shield construction, based on extensive use of the technique for tunnel construction in China Discusses challenges in construction in gravel, soft-soil, composite and rock strata Provides engineers with applicable insights into shield equipment and construction techniques

This book gives a comprehensive introduction to the new geophysical detection theories, methods and technologies of tunnel engineering under complex geological conditions and environments. It mainly focuses on the application of 3D seismic technique, 3D high-power resistivity sounding, and 3D GPR, etc. There are 7 chapters in the book. Chapter 1 introduces the state of the art and developing trends of geophysical detection technologies for tunnel engineering. Chapter 2 analyzes the complex geological conditions and environments for tunnel construction and the latest geophysical detection technologies. Chapter 3 to Chapter 7 systematically elaborate on the 3D seismic techniques, 3D detection technologies for water content in tunnel surrounding rocks, 3D detection technologies for side/back slope, 3D detection technologies for shield tunneling, and 3D detection technologies for collapse treatment of tunnel construction. The book presents numerous case studies to illustrate the applications of these technologies.

Harmonising Rock Engineering and the Environment

Innovation in Public Transportation

eWork and eBusiness in Architecture, Engineering and Construction

New World Situation: New Directions in Concurrent Engineering

Proceedings of the ITA World Tunneling Congress, Amsterdam 2003.

Reclaiming The Underground Space - Volume 2