

## Geotecnica Lancellotta

The conservation of monuments and historic sites is one of the most challenging problems facing modern civilization. It involves, in inextricable patterns, factors belonging to different fields (cultural, humanistic, social, technical, economical, administrative) and the requirements of safety and use appear to be (or often are) in conflict with the respect of the integrity of the monuments. The complexity of the topic is such that a shared framework of reference is still lacking among an historians, architects, structural and geotechnical engineers. The complexity of the subject is such that a shared frame of reference is still lacking among art historians, architects, architectural and geotechnical engineers. And while there are exemplary cases of an integral approach to each building element with its static and architectural function, as a material witness to the culture and construction techniques of the original historical period, there are still examples of uncritical reliance on modern technology leading to the substitution from earlier structures to new ones, preserving only the iconic look of the original monument. Geotechnical Engineering for the Preservation of Monuments and Historic Sites III collects the contributions to the eponymous 3rd International ISSMGE TC301 Symposium (Naples, Italy, 22-24 June 2022). The papers cover a wide range of topics, which include: - Principles of conservation, maintenance strategies, case histories - The knowledge: investigations and monitoring - Seismic risk, site effects, soil structure interaction - Effects of urban development and tunnelling on built heritage - Preservation of diffuse heritage: soil instability, subsidence, environmental damages. The present volume aims at geotechnical engineers and academics involved in the preservation of monuments and historic sites worldwide.

As dams age, they are subject to a series of external agents and processes which tend to deteriorate the qualities with which they were originally conceived to stand against these actions. At the same time, it is often necessary to respond to increased safety standards, either in the structural or hydrological fields. Reservoir sedimentation or wat

Geotechnical Engineering treats the mechanics of soils and structures interacting with soils. Its primary aim is to reach undergraduate students, however, as it also discusses the more advanced aspects of soil behaviour, it will also appeal to graduate students. Furthermore, practicing engineers who are in search of a rational introduction to the behaviour of foundation structures will find this work a valuable aid. The three areas contributing to a successful teaching of

geotechnical engineering are covered: applied mechanics; tests and experiments; and observation. A list of more than 450 selected references has been added for those readers who wish to study specific topics in more detail.

Proceedings of the IUTAM Symposium held at the University of Stuttgart, Germany, September 5–10, 1999

Modeling and Mechanics of Granular and Porous Materials

IUTAM Symposium on Theoretical and Numerical Methods in Continuum Mechanics of Porous Materials

Historic Towers

Symposium on the Pressurimeter and Its Marine Applications

Revue Canadienne de Géotechnique

An ideal resource for civil engineers working with offshore structures, pipelines, dredging, and coastal erosion, Seafloor Processes and Geotechnology bridges the gap between the standard soil mechanics curriculum of civil engineering and published material on marine geotechnology. Utilizing organized information on sediments and foundations for marine applications from a variety of sources, it provides practical reference information and approaches for analysis and design. This book provides an understanding of the processes and loadings affecting the sediment/water interface and the sediment column on the continental shelf and slope as well as the abyssal plains. It outlines the geological and geotechnical factors that should be considered in an investigation, and provides practicing professionals with the information they need to analyze potential environmental hazards and problems in marine foundations and slope stability. It covers geology, site investigation, drilling and sampling sediments, material properties, foundation design, slope stability, and more. Exploring marine geotechnology from a historical perspective, this book: Describes the development of marine geotechnology, the marine environment, and the geology of the seabed Discusses the various elements of a site investigation Explains how to investigate a site by remote sensing over the macro scale, probing to look at a more defined area, and drilling and sampling at the micro scale Looks at the physical, acoustic, and geochemical properties of marine sediments at the micro scale Focuses on slope stability and marine foundations Seafloor Processes and Geotechnology provides the background for in situ investigation, drilling, soil sampling, and laboratory testing technologies and serves as a complete handbook for engineers, geologists, as well as marine and environmental scientists.

Modelling forms an implicit part of all engineering design but many engineers engage in modelling without consciously considering the nature, validity and consequences of the supporting assumptions. Derived from courses given to postgraduate and final year undergraduate MEng students, this book presents some of the models that form a part of the typical undergraduate geotechnical curriculum and describes some of the aspects of soil behaviour which contribute to the challenge of geotechnical modelling.

Assuming a familiarity with basic soil mechanics and traditional methods of geotechnical design, this book is a valuable tool for students of geotechnical and structural and civil engineering as well as also being useful to practising engineers involved in the specification of numerical or physical geotechnical modelling. This book contains peer-reviewed papers from the Second World Landslide Forum, organised by the International Consortium on Landslides (ICL), that took place in September 2011. The entire material from the conference has been split into seven volumes, this one is the seventh: 1. Landslide Inventory and Susceptibility and Hazard Zoning, 2. Early Warning, Instrumentation and Monitoring, 3. Spatial Analysis and Modelling, 4. Global Environmental Change, 5. Complex Environment, 6. Risk Assessment, Management and Mitigation, 7. Social and Economic Impact and Policies.

Il contenimento del fronte di scavo nella esecuzione di opere edili

From Research to Applied Geotechnics

La Mesure, la Sélection, Et L'usage de Paramètres de Conception Dans la Géotechnique

Proceedings of Numerical and Experimental Techniques - Proceedings of the IVth Int. Seminar on Structural Analysis of Historical Constructions, 10-13 November 2004, Padova, Italy

Characterisation and Engineering Properties of Natural Soils

Proceedings of the Second International Symposium on Pre-Failure Deformation Characteristics of Geomaterials : Torino 99 : Torino, Italy 28-30 September, 1999

This second volume of a specialty 2-volume works contains 34 papers pertaining to the natural behaviour of diverse geomaterials found in different parts of the world. Each paper is organized along the outline: location and distribution, engineering geology, composition, state and index properties, structure, engineering properties, quality / reliability of data with reference to methods of sampling and testing, and relation to engineering problems. This extensive body of collated knowledge is integrated by three overview papers covering engineering geology, mechanical behaviour and engineering implications. Topics: Overview papers; Marine clays; Eastuarine Clays; Lacustrine clays; Stiff clays; Sands and other cohesionless soils; Residual and other topical soils; Weak rock.

The contributions to this volume examine: geotechnical hazard acknowledging the diversity of local ground conditions and environmental factors which play a decisive role in designing engineering structures in Danubian countries.

Conservation of monuments and historic sites is one of the most challenging problems facing modern civilization. It involves various cultural, humanistic, social, technical, economical and administrative factors, intertwining in inextricable patterns. The complexity of the topic is such that guidelines or recommendations for intervention techniques and design approaches are difficult to set. The Technical Committee on the Preservation of Monuments and Historic Sites (named TC19) was established by the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) in 1981, is supported by the Italian Geotechnical Society (AGI), and was renamed TC301 in 2010. This book assesses the role of historic towers as symbols of community identity and how to best preserve this special cultural heritage. Well-documented, exemplary case histories highlight concepts of preservation, integrity, cultural heritage, dynamic identification techniques and techniques for long-term monitoring of historic towers, as well as provide examples of appropriate intervention measures. The book will be of interest to professionals and academics in the wider fields of civil engineering, architecture and cultural resources management, and particularly those involved in art history, history of architecture, geotechnical engineering, structural engineering, archaeology, restoration and cultural heritage management.

Challenges and Innovations in Geomechanics

Tesi di dottorato

Mecânica dos Solos. Vol.2: Introdução à Engenharia Geotécnica

Bibliografia nazionale italiana

Proceedings of the Fourth International RILEM Symposium

Seafloor Processes and Geotechnology

The 17th Annual Meeting on Soil Mechanics and Geotechnical Engineering (PCSMGE) was held in Mexico in 1959. Every 4 years since then, PCSMGE has brought together the geotechnical engineering community from all over the world to discuss the problems, solutions and future challenges facing this engineering sector. Sixty years after the first conference, the 2019 edition returns to Mexico. The XVI PCSMGE 2019 conference was held in Cancun, Mexico, from 17 – 20 November 2019. This book presents the plenary lectures from the conference, delivered by distinguished geotechnical engineers of international renown. Experience and youth combine in this special publication, which includes the 9th Arthur Casagrande lecture, the plenary lecture of the ISSMGE President, 3 Bright Spark lectures, and the manuscripts of the 13 invited lecturers of practically all the technical sessions at the XVI PCSMGE 2019. Topics cover both research and applied geotechnics, including recent developments in geotechnical engineering. Representing a valuable reference for engineering practitioners and graduate students, and helping to identify new issues and shape future directions for research, the book will be of interest to all those working in the field, involved in soil mechanics and geotechnical engineering.

The EUROMECH Colloquium 366, 'Porous Media - Theory and Experiments' was held at the Bildungszentrum für die Entsorgung und Wasserwirtschaft GmbH B E W, Essen, Germany, from 23 to 27 June 1997. The goal of EUROMECH 366 was the presentation of recent findings in the macroscopic porous media theory (mixture theory restricted by the volume fraction concept) concerning general concepts and special investigations in the theoretical as well as the experimental field. Herein, numerical results requiring new solution strategies were also to be included. Moreover, foundations of fundamental state ments in the macroscopic porous media theory (e.g. the effective stress principle for incompressible and compressible constituents by Biot) are reviewed. Emphasis is placed upon the need to bring together scientists from various branches where porous media theories play a dominant role, namely from theoretical mechanics, agriculture, biomechanics, chemical engineering, geophysics and mechanics as well as from petroleum energy and environmental engineering. More than 80 people from 12 different countries expressed their interest in the Colloquium, and finally, 58 took part in the meeting presenting 42 papers. Among the talks were seven principal lectures given by leading scientists in the a.m. fields invited by the organizers. As Chairman of EUROMECH 366, I would like to thank the co-chairmen and all of my co-workers from the Institute of

Mechanics, FB 10, University of Essen, for their help in organizing the Colloquium, in particular, Dr.-Ing. W. Walther, Priv.-Doz. This book is unique on the subject because it is not so much a collection of individual work, but basically comprising national reports from most European countries on the present-day design methods, as prescribed in more or less strict national codes or recommendations and so daily used in practice by consulting engineers and contractors. As far as already implemented, the application of these methods within the framework of Eurocode 7 is described as well. In order to improve the understanding of the design methods, the national papers also consider aspects such as the local piling practice, limitations of the design methods, some practical examples and particular national experiences. The proceedings also include the contributions of two invited speakers as well as those of the three session discussion leaders, focusing on some particular aspects with regards to pile design. The book is of particular interest for those who are involved with pile design in practice, consulting engineers, piling contractors, control organisms as well as those dealing with geotechnical normalisation and research work.

Geomechanics and Water Engineering in Environmental Management

Geotecnica

Geotechnical Modelling

The Leaning Tower

The Restoration of Ghirlandina Tower in Modena and the Assessment of Soil-Structure Interaction by Means of Dynamic Identification Techniques

Geotechnics and Heritage

FUNDAMENTALS OF GEOTECHNICAL ENGINEERING is a concise combination of the essential components of Braja Das' market leading texts, Principles of Geotechnical Engineering and Principles of Foundation Engineering. The text includes the fundamental concepts of soil mechanics as well as foundation engineering without becoming cluttered with excessive details and alternatives.

FUNDAMENTALS features a wealth of worked out examples, as well as figures to help students with theory and problem solving skills. Das maintains the careful balance of current research and practical field applications that has made his books leaders in this area. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Internationally, the mechanized excavation of tunnels has intensified in the last two decades, as the number of tunnels being constructed for subways and railway underpasses increases. The subject of mechanized tunnelling in urban areas has not previously received the attention that it deserves, despite there being specific hazards associated with the construction of tunnels in metropolitan areas, including poor ground conditions, water tables higher than the level of tunnels, and subsidence leading to damage to the existing structures on the surface. The application of technologies for achieving the stability of the tunnel and for minimizing surface settlement is described in this book. Accurate characterization of the ground, rigorous assessment and management of risk from design to maintenance; the correct choice of a tunnel boring machine and a plan for the advancement of the tunnel; specific excavation procedures and real-time monitoring of excavation parameters are all discussed in this thorough work.

During the last decades, continuum mechanics of porous materials has achieved great attention, since it allows for the consideration of the volumetrically coupled behaviour of the solid matrix deformation and the pore-fluid flow. Naturally, applications of porous media models range from civil and environmental engineering, where, e. g., geote- nical problems like the consolidation problem are of great interest, via mechanical engineering, where, e. g., the description of sinter materials or polymeric and metallic foams is a typical problem, to chemical and biomechanical engineering, where, e. g., the complex structure of l- ing tissues is studied. Although these applications are principally very different, they basically fall into the category of multiphase materials, which can be described, on the macroscale, within the framework of the well-founded Theory of Porous Media (TPM). With the increasing power of computer hardware together with the rapidly decreasing computational costs, numerical solutions of complex coupled problems became possible and have been seriously investigated. However, since the quality of the numerical solutions strongly depends on the quality of the underlying physical model together with the experimental and mathematical possibilities to successfully determine realistic material parameters, a successful treatment of porous materials requires a joint consideration of continuum mechanics, experimental mechanics and numerical methods. In addition, micromechanical - vestigations and homogenization techniques are very helpful to increase the phenomenological understanding of such media.

Hydrogeological Instability in Cohesive Soils

Progettazione geotecnica

Applied Geomorphology

Porous Media: Theory and Experiments

Pre-failure Deformation Characteristics of Geomaterials

Surface Waves in Geomechanics: Direct and Inverse Modelling for Soils and Rocks

This book gathers the latest advances, innovations, and applications in the field of computational geomechanics, as presented by international researchers and engineers at the 16th International Conference of the International Association for Computer Methods and Advances in Geomechanics (IACMAG 2020/21). Contributions include a wide range of topics in geomechanics such as: monitoring and remote sensing, multiphase flow, reliability and analysis, surface structures, deep structures, dams and earth structures, coastal engineering, mining engineering, earthquake and dynamics, soil-atmosphere interaction, ice mechanics, landfills and waste disposal, gas and petroleum engineering, geothermal energy, offshore technology, energy geosciences, geomechanical numerical models and computational rail geotechnics. This is the first book to bring together practical examples from around the world to show how geomorphological evidence can help in effective land utilisation and hazard risk assessment. Case studies provide important lessons in risk management, and experts provide summaries of current research. The text also promotes good practice and effective land use, and looks at problems caused by misuse of the environment and potential solutions based on geomorphological evidence.

This volume deals with the most modern and topical problems of bridge design. The topics presented allow to tackle both theoretical-analytical as well as technical-constructive aspects of the design problem, pointing out how in the case of bridges, specifically for long span bridges, the two aspects are absolutely inseparable. In modern bridges, reasons of technical and economic feasibility oblige an extreme parceling of the construction process, with the consequent need to revise, with respect to the past, both design concepts as well as the theoretical apparatus of analysis that governs it. All this can clearly be derived from reading the present volume, in which the different contributions stress theoretical and technical questions of particular interest and topicality, without claiming to approach them systematically, but offering clear procedural rules and trend indications. With reference to the theoretical approach, some of particular importance are reviewed, such as the possibility of using limit analysis, the simplification of the design process for bridges, durability, and computer aided design. For what concerns the bridge typologies and the corresponding constructive problems, the emphasis is mostly on the ones still in an evolutionary phase, that is long span suspended/stayed bridges and cantilever-arched segments.

Geotechnical Engineering for the Preservation of Monuments and Historic Sites

Landslide Science and Practice

Blocchi di ancoraggio di condotte sui terreni - Quaderno Tecnico n. 2

Dam Maintenance and Rehabilitation II

Geotechnical Engineering for the Preservation of Monuments and Historic Sites III

Secondo Eurocodice 7 e le Norme Tecniche per le Costruzioni 2018

*This book is the first of a series of volumes on Built Heritage and Geotechnics, intended to reach a wide audience: professionals and academics in the fields of civil engineering, architecture, restoration and cultural heritage management, and even the wider public. The present volume provides essential information on the history of the construction of the Ghirlandina Tower in Modena, the techniques involved and the restoration works, and proves how the interaction with the supporting soil may explain the reasons behind the corrections that masons implemented during construction, the pattern of settlements suffered by the tower and the Cathedral and their mutual interaction. In addition to the above, there is one particular aspect that should capture the interest of a wide readership: in 1997 the Cathedral and the Ghirlandina Tower were included in the UNESCO World Heritage List, and it was recognized that the creation process shared by Lanfranco and Wiligelmo is a masterpiece of human creativity, in which a new dialectical relationship between architecture and sculpture was created in Romanesque art. The Modena complex bears exceptional witness to the cultural traditions of the 12th century in northern Italy's urban society, its organization, religious character, beliefs, and values all being reflected in the history of the buildings.*

*Il volume vuole essere una guida pratica all'interpretazione e all'uso dell'Eurocodice 7 (EC7) e delle nuove Norme Tecniche per le Costruzioni (NTC2018), rivolta agli allievi dei corsi universitari e ai professionisti. Ampio rilievo è stato dato agli esempi svolti per rendere chiara la comprensione della norma e per far acquisire familiarità con le nuove procedure di verifica. Sono stati trattati tutti i casi più ricorrenti della progettazione geotecnica, partendo comunque dal presupposto che il lettore abbia le conoscenze dei principi di Geotecnica impartite nei corsi universitari di base. Per questo motivo, gli argomenti sono stati trattati seguendo un criterio di comodità espositiva, senza preoccuparsi dell'ordine con il quale gli stessi argomenti sono presentati nelle NTC2018 o nell'EC7. Rispetto alla precedente edizione, la trattazione risulta arricchita dall'esposizione dei concetti di base della progettazione geotecnica in zona sismica, con i relativi esempi applicativi.*

*Theories of surface waves develop since the end of XIX century and many fundamental problems like existence, phase and group velocities, attenuation (quality factor), mode conversion, etc. have been, in part successfully, solved within the framework of such simple models as ideal fluids\* or linear elasticity. However, a sufficiently complete presentation of this subject, particularly for solids, is still missing in the literature. The sole exception is the book of I. A. Viktorov\* which contains an extensive discussion of fundamental properties of surface waves in homogeneous and stratified linear elastic solids with particular emphasis on contributions of Russian scientists. Unfortunately, the book has never been translated to English and its Russian version is also hardly available. Practical applications of surface waves develop intensively since a much shorter period of time than theories even though the motivation of discoverers of surface waves such as Lord Rayleigh stems from their appearance in geophysics and seismology. Nowadays the growing interest in practical applications of surface waves stem from the following two main factors: surface waves are ideal for developing relatively cheap*

*and convenient methods of nondestructive testing of various systems spanning from nanomaterials (e.g.*

*Proceedings of an ERTC-3 seminar, Brussels, 17-18 April 1997*

*Mechanical Tests for Bituminous Mixes - Characterization, Design and Quality Control*

*Theory and Practice*

*The Restoration of the Century*

*Geotechnical Hazards*

*12o Conferencia Panamericana de Mecánica de Suelos E Ingeniería Geotécnica, 39th U.S. Rock Mechanics Symposium, June 22-26th, 2003, Cambridge, Massachusetts, USA.*

All the traces of historic heritage are a fundamental part of our environment and toward us in the form of cultural enrichment, with the ability to have a positive effect both on our lifestyle and economy. Therefore, the preservation of ancient monuments, historic towns and sites has increasingly drawn the attention of public opinion, governmental agencies as well as consultants and contractors. This interest must be however carefully controlled and directed, since the conservation of monuments and historic sites is one of the most challenging problems of our age. Careless attempts at preservation can be detrimental not only to their iconic value (formal integrity), but even to their structural characteristics and the materials they are built with (material integrity). Geotechnical Engineering for the Preservation of Monuments and Historic Sites collects one opening address, four special lectures and 82 contributions from all over the world, giving a unique sample of the geotechnical problems to be tackled, the solutions currently being proposed, and the strategies being carried out to preserve the overall integrity of monuments and historic sites. It is clearly apparent that differences exist around the world not only in terms of the characteristics of the monuments or sites to be preserved, but also in the approaches adopted to achieve this aim. Hence, no unique solution is available to the geotechnical engineer dealing with the delicate structures and sites that represent our cultural heritage, and knowledge of previous experiences may be a unique guide in any technical decision-making process.

GeotecnicaGeotechnics and HeritageHistoric TowersGRC Press

Structural Analysis of Historical Constructions contains about 160 papers that were presented at the IV International Seminar on Structural Analysis of Historical Constructions that was held from 10 to 13 November, 2004 in Padova Italy. Following publications of previous seminars that were organized in Barcelona, Spain (1995 and 1998) and Guimar á es, Portugal (2001), state-of-the-art information is presented in these two volumes on the preservation, protection, and restoration of historical constructions, both comprising monumental structures and complete city centers. These two proceedings volumes are devoted to the possibilities of numerical and experimental techniques in the maintenance of historical structures. In this respect, the papers, originating from over 30 countries, are subdivided in the following areas: Historical aspects and general methodology, Materials and laboratory testing, Non-destructive testing and inspection techniques, Dynamic behavior and structural monitoring, Analytical and numerical approaches, Consolidation and strengthening techniques, Historical timber and metal structures, Seismic analysis and vulnerability assessment, Seismic strengthening and innovative systems, Case studies. Structural Analysis of Historical Constructions is a valuable source of information for scientists and practitioners working on structure-related issues of historical constructions

Invited Lectures of the XVI Pan-American Conference on Soil Mechanics and Geotechnical Engineering (XVI PCSMGE), 17-20 November 2019, Cancun, Mexico

Volume 3: Spatial Analysis and Modelling

Advanced Problems in Bridge Construction

Structural Analysis of Historical Constructions - 2 Volume Set

Geotechnical Engineering

**Divided into four parts, this work presents integrated studies and regional and case studies, and covers environmental constraints and effects, and the behaviour of earth masses.**

**This book discusses techniques for predicting, preventing and controlling the hydrogeological instability of slopes consisting of cohesive soils. The proposed methodology is practical and innovative, and assumes a dynamic valence in defining the deformation process of underground failure as well as its activation through the assumption of a four-dimensional space-time continuum. This latter aspect is crucial for predicting a landslide in time to control it. At present, predicting, preventing and controlling hydrogeological instability in cohesive soils relies on mathematical modelling using specific software, the predictive reliability of which is rather deficient. Such modelling is based upon deterministic processes, which are entirely unsuitable for dealing with the complexity of vital processes occurring during the genesis of a landslide. In this work, the three-dimensional vision of a landslide as a set of distinct and independent phenomena is abandoned and the prediction and prevention of hydrogeological instability is pursued through the alternative of an indivisible totality of natural phenomena that includes the time factor. The book is of interest to graduates and researchers of applied geology, geotechnical, environmental and civil engineering, as well as professionals in the fields of hydrogeology and natural hazards.**

**Soils are complex materials: they have a particulate structure and fluids can seep through pores, mechanically interacting with the solid skeleton. Moreover, at a microscopic level, the behaviour of the solid skeleton is highly unstable. External loadings are in fact taken by grain chains which are continuously destroyed and rebuilt. Many issues of modelling, even of the physical details of the phenomena, remain open, even obscure; de Gennes listed them not long ago in a critical review. However, despite physical complexities, soil mechanics has developed on the assumption that a soil can be seen as a continuum, or better yet as a medium obtained by the superposition of two and sometimes three con and the other fluids, which occupy the same portion of tinua, one solid phase. Furthermore, relatively simple and robust constitutive laws were adopted to describe the stress-strain behaviour and the interaction between the solid and the fluid continua. The contrast between the intrinsic nature of soil and the simplistic engineering approach is self-evident. When trying to describe more and more sophisticated phenomena (static liquefaction, strain localisation, cyclic mo bility, effects of diagenesis and weathering, , .... ), the naive description of soil must be abandoned or, at least, improved. Higher order continua, incrementally non-linear laws, micromechanical considerations must be taken into account. A new world was opened, where basic mathematical questions (such as the choice of the best tools to model phenomena and the proof of the well-posedness of the consequent problems) could be addressed.**

**Design of Axially Loaded Piles - European Practice**

**Mechanized Tunnelling in Urban Areas**

**Fundamentals of Geotechnical Engineering**

**Proceedings of the 16th International Conference of IACMAG - Volume 2**

**Canadian Geotechnical Journal**

**Design methodology and construction control**

Established as a standard textbook for students of geotechnical engineering, this second edition of Geotechnical Engineering provides a solid grounding in the mechanics of soils and soil-structure interaction Renato Lancellotta gives a clear presentation of the fundamental principles of soil mechanics and demonstrates how these principles are

This book forms the Proceedings of an International RILEM Symposium, the fourth in the series, on Testing of Bituminous Mixes in Budapest, Hungary, October 1990. The aim of the Symposium is to promote tests for the characterization, design and quality control of bituminous mixes which combine the best features of traditional and modern approaches. Among the topics covered are specimen preparation, tests with unique loading (Marshall test, uniaxial tension and creep tests etc), which are used for mix design or control of mechanical properties, and tests with repeated loading, which give information on fatigue, permanent deformation and moduli, especially for mix design.

Techniques for Prediction, Prevention and Control