

## Ground Penetrating Radar Theory And Practice

The final chapter provides a description, supplied by the manufacturers, of current commercially available radar systems. The aim of the book is to provide an introduction to the subject at graduate level for practising engineers and scientists as well as providing a useful reference to current research.

This book provides readers with a solid understanding of the capabilities and limitations of the techniques used for buried object detection. Presenting theory along with applications and the existing technology, it covers the most recent developments in hardware and software technologies of sensor systems with a focus on primary sensors such as Ground Penetrating Radar (GPR) and auxiliary sensors such as Nuclear Quadruple Resonance (NQR). It is essential reading for students, practitioners, specialists, and academicians involved in the design and implementation of buried object detection sensors.

This thoroughly revised and expanded edition of the much acclaimed Encyclopedia of Coastal Science edited by M. Schwarz (Springer 2005), presents an interdisciplinary approach that includes biology, ecology, engineering, geology, geomorphology, oceanography, remote sensing, technological advances, and anthropogenic impacts on coasts. Within its covers the Encyclopedia of Coastal Science, 2nd ed. brings together and coordinates many aspects of coastal and related sciences that are widely dispersed in the scientific literature. The broadly interdisciplinary subject matter of this volume features contributions by over 280 well-known international specialists in their respective fields and provides an abundance of figures in full-color with line drawings and photographs, and other illustrations such as satellite images. Not only does this volume offer a large number of new and revised entries, it also includes an illustrated glossary of coastal geomorphology, extensive bibliographic citations, and cross-references. It provides a comprehensive reference work for students, scientific and technical professionals as well as administrators, managers, and informed lay readers. Reviews from the first edition: Awarded for Excellence in Scholarly and Professional Publishing: “ Honorable Mention ” , in the category Single Volume/Science from the Association of American Publishers (AAP) 2005. "The contents and approach are interdisciplinary and, under a single cover, one finds subjects normally scattered throughout scientific literature." "The topics cover a broad spectrum, so does the geographic range of the contributors. ... besides geomorphologists, biologists, ecologists, engineers, geographers, geologists, oceanographers and technologists will find information related to their respective fields ... . Inclusion of appendices ... is very useful. The illustrated glossary of geomorphology will prove very useful for many of us ... ." Roger H. Charlter, Journal of Coastal Research, Volume 21, Issue 4, Page 866, July 2005. "It is an excellent work that should be included in any carefully selected list of best science reference books of the year "Summing Up: Highly recommended." M.L. Larsgaard, Choice, Volume 43, Issue 6, Page 989, February 2006. "This volume is a comprehensive collection of articles covering all aspects of the subject: social and economic, engineering, coastal processes, habitats, erosion, geological features, research and observation." ... "As with similar works reviewed, I chose to read articles on familiar topics to see if they covered the expected, and some on unfamiliar topics to see if they could be readily understood. The book passed both tests, but the style is denser and more fact-filled than most of the encyclopedias I have reviewed." John Goodier, Reference Reviews, Volume 20, Issue 2, pages 35-36, 2006

An evolving, living organic/inorganic covering, soil is in dynamic equilibrium with the atmosphere above, the biosphere within, and the geology below. It acts as an anchor for roots, a purveyor of water and nutrients, a residence for a vast community of microorganisms and animals, a sanitizer of the environment, and a source of raw materials for construction and manufacturing. To develop lasting solutions to the challenges of balanced use and stewardship of the Earth, we require a fundamental understanding of soil—from its elastic, porous three-phase system to its components, processes, and reactions. Handbook of Soil Sciences: Properties and Processes, Second Edition is the first of two volumes that form a comprehensive reference on the discipline of soil science. Completely revised and updated to reflect the current state of knowledge, this volume covers the traditional areas of soil science: soil physics, soil chemistry, soil mineralogy, soil biology and biochemistry, and pedology. Contributors discuss the application of physical principles to characterize the soil system and mass and energy transport processes within the critical zone. They present significant advances in soil chemistry; describe how minerals are formed and transformed; and provide an introduction to the soil biota. They also examine geomorphology, land use, hydro pedology, and subaqueous soils as well as the classification and digital mapping of soil. Critical elements addressed in each section include: Descriptions of concepts and theories Definitions, approaches, methodologies, and procedures Data in tabular and figure format Extensive references This cohesive handbook provides a thorough understanding of soil science principles and practices based on a rigorous, complete, and up-to-date treatment of the subject matter compiled by leading scientists. It is a resource rich in data, offering professional soil scientists, agronomists, engineers, ecologists, biologists, naturalists, and students their first point of entry into a particular aspect of the soil sciences.

Engineering Geology for Society and Territory - Volume 5

Tests of Sommerfeld Ground Wave Theory Using Ground-penetrating Radar Pulses

An Introduction for Archaeologists

Subsurface Sensing

State of the Art and Case Studies

Theory and Application, Mapping Hudson River Sediments at Saugerties, New York

**This book is one out of 8 IAEG XII Congress volumes, and deals with the theme of urban geology. Along with a rapidly growing world population, the wave of urban growth continues, causing cities to swell and new metropolitan centers to emerge. These global trends also open new ventures for underground city development. Engineering geology plays a major role in facing the increasing issues of the urban environment, such as: finding aggregates for construction works; providing adequate water supply and waste management; solving building problems associated to geological and geomorphological conditions; evaluating host rock conditions for underground constructions; preventing or mitigating geological and seismic hazards. Furthermore, this book illustrates recent advancements in sustainable land use planning, which includes conservation, protection, reclamation and landscape impact of open pit mining and alternative power generation. The Engineering Geology for Society and Territory volumes of the IAEG XII Congress held in Torino from September 15–19, 2014, analyze the dynamic role of engineering geology in our changing world and build on the four main themes of the congress: environment, processes, issues and approaches. The congress topics and subject areas of the 8 IAEG XII Congress volumes are: 1. Climate Change and Engineering Geology 2. Landslide Processes River Basins 3. Reservoir Sedimentation and Water Resources 4. Marine and Coastal Processes Urban Geology 5. Sustainable Planning and Landscape Exploitation 6. Applied Geology for Major Engineering Projects 7. Education, Professional Ethics and Public Recognition of Engineering Geology 8. Preservation of Cultural Heritage**

**This book gathers the proceedings of the 15th IFToMM World Congress, which was held in Krakow, Poland, from June 30 to July 4, 2019. Having been organized every four years since 1965, the Congress represents the world’s largest scientific event on mechanism and machine science (MMS). The contributions cover an extremely diverse range of topics, including biomechanical engineering, computational kinematics, design methodologies, dynamics of machinery, multibody dynamics, gearing and transmissions, history of MMS, linkage and mechanical controls, robotics and mechatronics, micro-mechanisms, reliability of machines and mechanisms, rotor dynamics, standardization of terminology, sustainable energy systems, transportation machinery, tribology and vibration. Selected by means of a rigorous international peer-review process, they highlight numerous exciting advances and ideas that will spur novel research directions and foster new multidisciplinary collaborations.**

**Precision farming, site infrastructure assessment, hydrologic monitoring, and environmental investigations – these are just a few current and potential uses of near-surface geophysical methods in agriculture. Responding to the growing demand for this technology, the Handbook of Agricultural Geophysics supplies a clear, concise overview of near-surface geophysical methods that can be used in agriculture and provides detailed descriptions of situations in which these techniques have been employed.**

**A real-world guide to practical applications of groundpenetrating radar (GPR) The nondestructive nature of ground penetrating radar makes itan important and popular method of subsurface imaging, but it is ahighly specialized field, requiring a deep understanding of theunderlying science for successful application. Introduction toGround Penetrating Radar: Inverse Scattering and DataProcessing provides experienced professionals with thebackground they need to ensure precise data collection andanalysis. Written to build upon the information presented in more generalintroductory volumes, the book discusses the fundamentalmathematical, physical, and engineering principles upon which GPRis built. Real-world examples and field data provide readers anaccurate view of day-to-day GPR use. Topics include: 2D scattering for dielectric and magnetic targets 3D scattering equations and migration algorithms Host medium characterization and diffraction tomography Time and frequency steps in GPR data sampling The Born approximation and the singular valuedecomposition The six appendices contain the mathematical proofs of allexamples discussed throughout the book.**

**Introduction to GroundPenetrating Radar: Inverse Scattering and Data Processing is acomprehensive resource that will prove invaluable in the field.**

Stratigraphic Analyses Using GPR

Handbook of Soil Sciences

Detection And Identification Of Visually Obscured Targets

ÅSPÖ Hard Rock Laboratory

A Fully Three-dimensional Simulation of a Ground-penetrating Radar

Ground-penetrating Radar for Archaeology

Advances in Near-surface Seismology and Ground-penetrating Radar (SEG Geophysical Developments Series No. 15) is a collection of original papers by renowned and respected authors from around the world. Technologies used in the application of near-surface seismology and ground-penetrating radar have seen significant advances in the last several years. Both methods have benefited from new processing tools, increased computer speeds, and an expanded variety of applications. This book, divided into four sections--"Reviews," "Methodology," "Integrative Approaches," and "Case Studies"--captures the most significant cutting-edge issues in active areas of research, unveiling truly pertinent studies that address fundamental applied problems. This collection of manuscripts grew from a core group of papers presented at a post-convention workshop, "Advances in Near-surface Seismology and Ground-penetrating Radar," held during the 2009 SEG Annual Meeting in Houston, Texas. This is the first cooperative publication effort between the near-surface communities of SEG, AGU, and EEGS. It will appeal to a large and diverse audience that includes researchers and practitioners inside and outside the near-surface geophysics community. --Publisher description.

Beginning with a review of the current need for identification of buried and surface unexplored ordnance such as mines, shells, bombs, this book then explains existing techniques for electromagnetic detection of such targets. A detailed treatment of target signatures (natural frequencies and related parameters) for identification and discrimination of false alarms is also given.

Traditional archaeological excavation methods are sometimes daunting due to political or financial complications. Other times, an improperly planned dig can destroy or entirely overlook the features or artifacts being sought. In either case, Ground-Penetrating Radar, or GPR, is an increasingly applicable technology, but one that few archaeologists truly understand. That is where this book excels. It is tailored towards an archaeological community which is for the most part apprehensive about using "high tech" instruments and feel more comfortable on their hands and knees digging in the dirt. Its abundant illustrations and easy-to-understand tables help to keep this potentially daunting subject matter accessible. It also contains more complex equations and theory so that the more technically-oriented can use it as a reference tool.

This book covers modeling and simulation methods as well as the support tools available to improve imaging and sensing for Ground Penetrating Radar (GPR). After an introduction to the basic concepts, the authors present a more detailed discussion, enabling readers to identify and apply the technique that best suits their goals. It is therefore an invaluable resource for anyone working with GPR. An appendix provides the basic concepts for a general mathematical description of the variables of interest and their spatial and temporal variations.

Encyclopedia of Coastal Science

Using Robots in Hazardous Environments

Landmine Detection, De-Mining and Other Applications

Theory and Experiments

Ground Penetrating Radar in Sediments

Ground Penetrating Radar Theory and Applications

**This book describes the application of non-destructive geophysical methods in subsurface archaeological features. Such non-destructive methods are magnetometry, electrical resistance, electromagnetic conductivity, magnetic susceptibility and ground penetrating radar. This book also includes the last improvements in instrumentation, data processing, and interpretations of the collected data sets leading to the rapid progress in geophysical applications in the field of archaeological investigations. The book also provides complete case-studies and archaeological interpretation obtained our results carried out in different localities around the world.**

**In this book “Radar Technology”, the chapters are divided into four main topic areas: Topic area 1: “Radar Systems” consists of chapters which treat whole radar systems, environment and target functional chain. Topic area 2: “Radar Applications” shows various applications of radar systems, including meteorological radars, ground penetrating radars and glaciology. Topic area 3: “Radar Functional Chain and Signal Processing” describes several aspects of the radar signal processing. From parameter extraction, target detection over tracking and classification technologies. Topic area 4: “Radar Subsystems and Components” consists of design technology of radar subsystem components like antenna design or waveform design.**

**This book provides a complete overview of novel and state of art sensing technologies and geotechnologies relevant to support management and conservation of CH sites, monuments and works of art. The book is organized in an introduction stating the motivations and presenting the overall content of the volume and four parts. The first part focuses on remote sensing and geophysics for the study of human past and cultural heritage at site scale and as element of the surrounding territory. The second part presents an overview of non invasive technologies for investigating monuments and works of art. The third part presents the new opportunities of ICT for an improved and safe cultural heritage fruition, from the virtual and augmented reality of historical context to artifact tracking. Finally, the forth part presents a significant worldwide set of success cases of the exploitation of the integration of geotechnologies in archeology and architectural heritage management. This book is of interest to researchers, experts of heritage science, archaeologists, students, conservators and other professionals of cultural heritage.**

**GPR Remote Sensing in Archaeology provides a complete description of the processes needed to take raw GPR data all the way to the construction of subsurface images. The book provides an introduction to the “theory” of GPR by using a simulator that shows how radar profiles across simple model structures look and provides many examples so that the complexity of radar signatures can be understood. It continues with a review of the necessary radargram signal processes needed along with examples. The most comprehensive methodology to construct subsurface images from either coarsely spaced data using interpolation or from dense data from multi-channel equipment and 3D volume generation is presented, advanced imaging solutions such as overlay analysis are introduced, and numerous worldwide site case histories are shown. The authors present their studies in a way that most technical and non-technical users of the equipment will find essentials for implementing in their own subsurface investigations.**

**GPR Remote Sensing in Archaeology**

**Sensing the Past**

**Ground-penetrating Radar**

**FDTD Theory Compared with Experiment**

**Urban Geology, Sustainable Planning and Landscape Exploitation**

**Inverse Scattering and Data Processing**

A concise and easy-to-read summary of all the latest and crucial aspects of ground-penetrating radar uses and data collection, analysis, and processing for archaeological mapping and exploration

Food security emerged as an issue in the first decade of the 21st Century, questioning the sustainability of the human race, which is inevitably related directly to the agricultural water management that has multifaceted dimensions and requires interdisciplinary expertise in order to be dealt with. The purpose of this book is to bring together and integrate the subject matter that deals with the equity, profitability and irrigation water pricing; modelling, monitoring and assessment techniques; sustainable irrigation development and management, and strategies for irrigation water supply and conservation in a single text. The book is divided into four sections and is intended to be a comprehensive reference for students, professionals and researchers working on various aspects of agricultural water management. The book seeks its impact from the diverse nature of content revealing situations from different continents (Australia, USA, Asia, Europe and Africa). Various case studies have been discussed in the chapters to present a general scenario of the problem, perspective and challenges of irrigation water use.

Discover the utility of four popular electromagnetic geophysical techniques In GeoRadar, FDEM, TDEM, and AEM Methods, accomplished researchers Fabio Giannino and Giovanni Leucci deliver an in-depth exploration of the theory and application of four different electromagnetic geophysical techniques: ground penetrating radar, the frequency domain electromagnetic method, the time domain electromagnetic method, and the airborne electromagnetic method. The authors offer a full description of each technique as they relate to the economics, planning, and logistics of deploying each of them on-site. The book also discusses the potential output of each method and how it can be combined with other sources of below- and above-ground information to create a digitized common point cloud containing a wide variety of data. Giannino and Leucci rely on 25 years of professional experience in over 40 countries around the world to provide readers with a fulsome description of the optimal use of GPR, FDEM, TDEM, and AEM, demonstrating their flexibility and applicability to a wide variety of use cases. Readers will also benefit from the inclusion of: A thorough introduction to electromagnetic theory, including the operative principles and theory of ground penetrating radar (GPR) and the frequency domain electromagnetic method (FDEM) An exploration of hardware architecture and surveying, including GPR, FDEM, time domain electromagnetic method (TDEM), and airborne electromagnetic (AEM) surveying A collection of case studies, including a multiple-geophysical archaeological GPR survey in Turkey and a UXO search in a building area in Italy using FDEM /i> Discussions of planning and mobilizing a campaign, the shipment and clearance of survey equipment, and managing the operative aspects of field activity Perfect for forensic and archaeological geophysicists, GeoRadar, FDEM, TDEM, and AEM Methods will also earn a place in the libraries of anyone seeking a one-stop reference for the planning and deployment of GDR, FDEM, TDEM, and AEM surveying techniques.

Ground-penetrating radar (GPR) has become one of the standard tools in the archaeologist’s array of methods, but users still struggle to understand what the images tell us. In this book—illustrated with over 200 full-color photographs—Lawrence Conyers shows how results of geophysical surveys can test ideas regarding people, history, and cultures, as well as be used to prospect for buried remains. Using 20 years of data from more than 600 GPR surveys in a wide array of settings, Conyers, one of the first archaeological specialists in GPR, provides the consumer of GPR studies with basic information on how the process works. He show how the plots are generated, what subsurface factors influence specific profiles, how the archaeologist can help the surveyor collect optimal data, and how to translate the results into useable archaeological information.

Improving Sensing and Imaging Through Numerical Modeling

Advances in Mechanism and Machine Science

Gpr Basics

Strapdown Inertial Navigation for Ground Penetrating Radar Data Acquisition

Surface-penetrating Radar

Soil & Water Conservation News

*This new edition of the well-established Kearey and Brooks text is fully updated to reflect the important developments in geophysical methods since the production of the previous edition. The broad scope of previous editions is maintained, with even greater clarity of explanations from the revised text and extensively revised figures. Each of the*

*major geophysical methods is treated systematically developing the theory behind the method and detailing the instrumentation, field data acquisition techniques, data processing and interpretation methods. The practical application of each method to such diverse exploration applications as petroleum, groundwater, engineering, environmental and forensic is shown by case histories. The mathematics required in order to understand the text is purposely kept to a minimum, so the book is suitable for courses taken in geophysics by all undergraduate students. It will also be of use to postgraduate students who might wish to include geophysics in their studies and to all professional geologists who wish to discover the breadth of the subject in connection with their own work.*

*This book, based on Transport and Urban Development COST Action TU1208, presents the most advanced applications of ground penetrating radar (GPR) in a civil engineering context, with documentation of instrumentation, methods and results. It explains clearly how GPR can be employed for the surveying of critical transport infrastructure, such as roads, pavements, bridges and tunnels and for the sensing and mapping of underground utilities and voids. Detailed attention is also devoted to use of GPR in the inspection of geological structures and of construction materials and structures, including reinforced concrete, steel reinforcing bars and pre/post-tensioned stressing ducts. Advanced methods for solution of electromagnetic scattering problems and new data processing techniques are also presented. Readers will come to appreciate that GPR is a safe, advanced, non destructive and noninvasive imaging technique that can be effectively used for the inspection of composite structures and the performance of diagnostics relevant to the entire life cycle of civil engineering works.*

*Advances in Near-surface Seismology and Ground-penetrating Radar (SEG Geophysical Developments Series No. 15) is a collection of original papers by renowned and respected authors from around the world. Technologies used in the application of near-surface seismology and ground-penetrating radar have seen significant advances in the last several years. Both methods have benefited from new processing tools, increased computer speeds, and an expanded variety of applications. This book, divided into four sections - "Reviews," "Methodology," "Integrative Approaches," and "Case Studies"--Captures the most significant cutting-edge issues in active areas of research, unveiling truly pertinent studies that address fundamental applied problems. This collection of manuscripts grew from a core group of papers presented at a postconvention workshop, "Advances in Near-surface Seismology and Ground-penetrating Radar," held during the 2009 SEG Annual Meeting in Houston, Texas. This is the first cooperative publication effort between the near-surface communities of SEG, AGU, and EEGS. It will appeal to a large and diverse audience that includes researchers and practitioners inside and outside the near-surface geophysics community.*

*Conyers succinctly and clearly lays out for archaeological practitioners the theory behind, and applications of, ground-penetrating radar as a non-invasive method of subsurface prospection. Describing the technology, the equipment, the analysis and interpretation necessary to produce usable results and full of examples from GPR projects throughout the world, this book also details advances in computer simulation, statistical modeling, virtual reality techniques, and data integration in recent years. Visit our website for sample chapters!*

*Interpreting Ground-penetrating Radar for Archaeology*

*Radar Technology*

*Introduction to Ground Penetrating Radar*

*Ground Penetrating Radar, 2nd Edition*

*From artifact to historical site*

*Problems, Perspectives and Challenges of Agricultural Water Management*

*There have been major recent advances in robotic systems that can replace humans in undertaking hazardous activities in demanding or dangerous environments. Published in association with the CLAWAR (Climbing and Walking Robots and Associated Technologies Association) (www.clawar.org), this important book reviews the development of robotic systems for de-mining and other risky activities such as fire-fighting. Part one provides an overview of the use of robots for humanitarian de-mining work. Part two discusses the development of sensors for mine detection whilst Part three reviews developments in both teleoperated and autonomous robots. Building on the latter, Part four concentrates on robot autonomous navigation. The final part of the book reviews research on multi-agent-systems (MAS) and the multi-robotics-systems (MRS), promising tools that take into account modular design of mobile robots and the use of several robots in multi-task missions. With its distinguished editors and international team of contributors, Using robots in hazardous environments: landmine detection, de-mining and other applications is a standard reference for all those researching the use of robots in hazardous environments as well as government and other agencies wishing to use robots for dangerous tasks such as landmine detection and disposal. Reviews the development of robotic systems for de-mining and other risky activities Discusses the development and applications of sensors for mine detection using different robotic systems Examines research on multi-agent-systems and multi-robotics systems*

*Ground-penetrating radar (GPR) is a rapidly developing field that has seen tremendous progress over the past 15 years. The development of GPR spans aspects of geophysical science, technology, and a wide range of scientific and engineering applications. It is the breadth of applications that has made GPR such a valuable tool in the geophysical consulting and geotechnical engineering industries, has lead to its rapid development, and inspired new areas of research in academia. The topic of GPR has gone from not even being mentioned in geophysical texts ten years ago to being the focus of hundreds of research papers and special issues of journals dedicated to the topic. The explosion of primary literature devoted to GPR technology, theory and applications, has lead to a strong demand for an up-to-date synthesis and overview of this rapidly developing field. Because there are specifics in the utilization of GPR for different applications, a review of the current state of development of the applications along with the fundamental theory is required. This book will provide sufficient detail to allow both practitioners and newcomers to the area of GPR to use it as a handbook and primary research reference. \*Review of GPR theory and applications by leaders in the field \*Up-to-date information and references \*Effective handbook and primary research reference for both experienced practitioners and newcomers*

*Discovered in 1976 by Sheets, and under continuous excavation and study since, the spectacular Ceren site provides us with an unusually clear window into the ancient past with which to view family activities on the frontier of the Mayan civilization. Since volcanic ash did not allow people to selectively remove artifacts, the site is well-preserved and it also largely stopped natural processes of decomposition offering this rare opportunity to study the Mayan past through household archaeology. Known as the New World Pompeii, this study provides a detailed portrait of the life, houses, artifacts, and activity areas of the people who supported the elites with labor, food and goods. As Sheets says, "With any civilization that's being studied, if the households of commoners aren't being investigated, you've eliminated the bulk of the population. How can you understand the society if you ignore most of the people? It's like an ethnography. Only we can't interview people, so their possessions have to speak for them." Art and images from the author's own collection help illuminate the discussions and bring them to life, while the author's discussion of his personal trials and triumphs add a more human dimension to working in the field.*

*This book describes the key elements of the subject of surface penetrating radar, and in general terms the inter-relationship between those topics in electromagnetism, soil science, geophysics and signal processing which form part of its design.*

*Theory and Practice*

*Electromagnetic Methods in Geophysics*

*An Ancient Village Buried by Volcanic Ash in Central America*

*Handbook of Agricultural Geophysics*

*Applications in GeoRadar, FDEM, TDEM, and AEM*

*A Handbook for Ground Penetrating Radar Users*

**GPR Basics: A Handbook for Ground Penetrating Radar Users** was written to help you gain an understanding of the fundamentals of ground penetrating radar and develop the confidence to appropriately utilize this technology. This book is organized in an approachable format that minimizes technical jargon and math. LearnGPR is known for its ease of training without compromising the quality and this book is no different. After reading this book you will understand how GPR works, recognize the limitations of the technology, increase survey success rates, expand the types of projects you can conduct, and feel confident speaking with both clients and industry professionals. The topics covered in this book include: -Electromagnetic Waves -GPR Antenna -Physical Properties of Materials -GPR Wave Behavior -Modeling GPR Signals -Data Interpretation -Data Visualization -Applications of GPR -Documenting and Reporting -Benefits and Limitations There has long been a strong collaboration between geologists and archaeologists, and the sub-field of geoarchaeology is well developed as a discipline in its own right. This book now bridges the gap between those fields and the geophysical technique of ground-penetrating radar (GPR), which allows for three-dimensional analysis of the ground to visualize both geological and archaeological materials. This method has the ability to produce images of the ground that display complex packages of materials, and allows researchers to integrate sedimentary units, soils and associated archaeological features in ways not possible using standard excavation techniques. The ability of GPR to visualize all these buried units can help archaeologists place ancient people within the landscapes and environments of their time, and understand their burial and preservation phenomena in three-dimensions. Readership: Advanced students in archaeology and geoarchaeology, as well as practicing archaeologists with an interest in GPS techniques.

Reviews the fundamental concepts behind the theory and computation of electromagnetic fields The book is divided in two parts. The first part covers both fundamental theories (such as vector analysis, Maxwell's equations, boundary condition, and transmission line theory) and advanced topics (such as wave transformation, addition theorems, and fields in layered media) in order to benefit students at all levels. The second part of the book covers the major computational methods for numerical analysis of electromagnetic fields for engineering applications. These methods include the three fundamental approaches for numerical analysis of electromagnetic fields: the finite difference method (the finite difference time-domain method in particular), the finite element method, and the integral equation-based moment method. The second part also examines fast algorithms for solving integral equations and hybrid techniques that combine different numerical methods to seek more efficient solutions of complicated electromagnetic problems. Theory and Computation of Electromagnetic Fields, Second Edition: Provides the foundation necessary for graduate students to learn and understand more advanced topics Discusses electromagnetic analysis in rectangular, cylindrical and spherical coordinates Covers computational electromagnetics in both frequency and time domains Includes new and updated homework problems and examples Theory and Computation of Electromagnetic Fields, Second Edition is written for advanced undergraduate and graduate level electrical engineering students. This book can also be used as a reference for professional engineers interested in learning about analysis and computation skills.

**Ground Penetrating Radar: Theory and Practice** is a practical guide to using this powerful underground surveying technique. The author uses her wide experience to explain the critical factors in using GPR and how parameters, such as wavelength, attenuation and loss need to be properly considered to obtain good survey results. The first chapter introduces the underlying physics and explains the formation of signal patterning. The next two chapters explain the significance of wavelengths for target detection, probing depths and resolution, and demonstrating the variety of signal presentation. Chapter four discusses why survey results are affected by water and air in the soil, and how this may affect depth readings. Additional chapters discuss a variety of methods for velocity calibration and suggests where they may be useful, challenging soil conditions and potential problem environments, data processing and a suite of useful techniques, amongst other important topics. The book gives a clear and formative guidance on understanding the critical factors in using GPR, as well as a checklist of surveying considerations. Covers the critical, practical factors in using a ground penetrating radar, including troubleshooting appropriate equipment selection Explains why wavelengths matter, providing practice calculations Offers insight into how to spot ringing (echo effects) and air signals, and how to distinguish these from subsurface data Enables the reader to understand the importance of calibration of transmission velocity and a range of methodsa

Proceedings of the 15th IFToMM World Congress on Mechanism and Machine Science

10 Years of Research

Ground-penetrating Radar for Geoarchaeology

Archaeogeophysics

Ground Penetrating Radar

Ground-Penetrating Radar for Archaeology