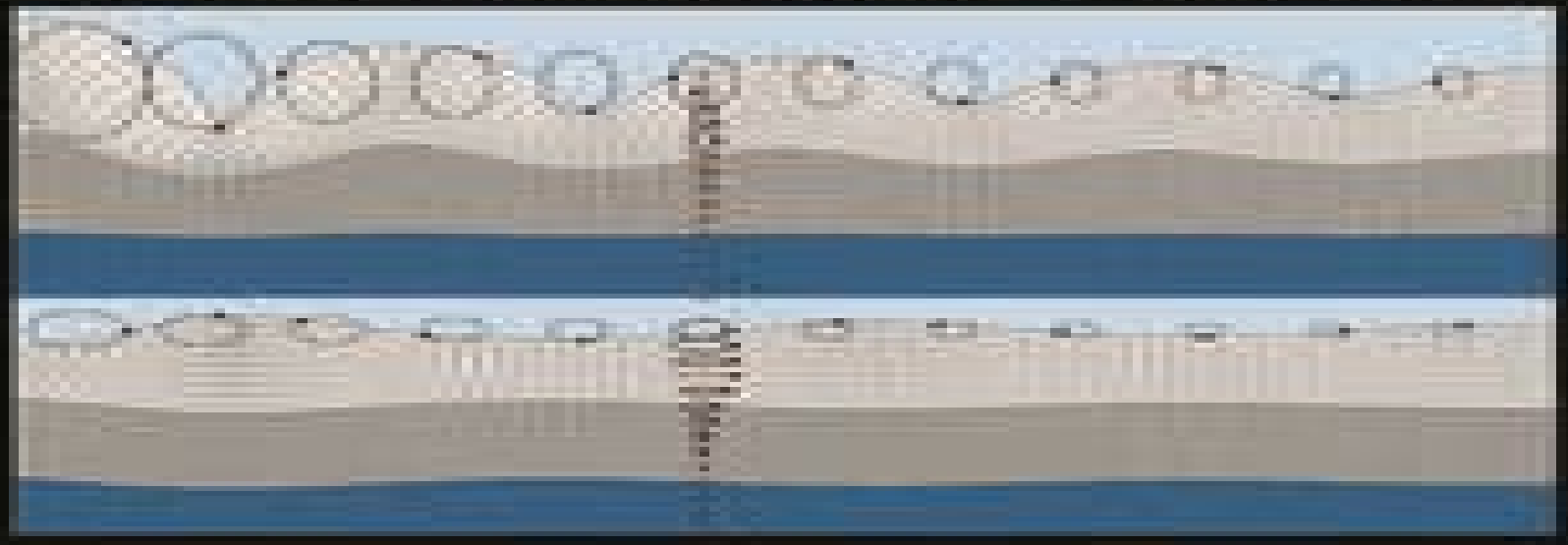
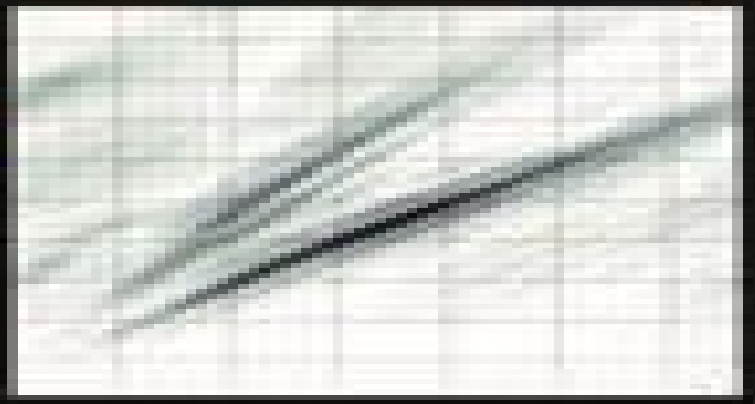
Surface Wave Methods for Near-Surface Site Characterization





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Surface Wave Methods for Near-Surface Site Characterization Sebastiano Foti,Carlo Lai,Glenn J. Rix,Claudio Strobbia,2014-08-21 Develop a Greater Understanding of How and Why Surface Wave Testing WorksUsing examples and case studies directly drawn from the authors experience Surface Wave Methods for Near Surface Site Characterization addresses both the experimental and theoretical aspects of surface wave propagation in both forward and inverse modeling This book accents *Surface Wave Methods for Near-Surface Site Characterization* Sebastiano Foti,Carlo G. Lai,Glenn J. Rix,Claudio Strobbia,2014-08-25 Surface wave methods analysis the dispersive nature of surface wave propagation in heterogeneous media to measure shear wave velocity or material damping ratio profiles and enable earthquake site response to be assessed This is the only comprehensive reference that provides a unified treatment of surface wave propagation signal processing inverse theory and the testing protocols that form the basis of modern surface wave methods The use of these tests has increased dramatically since the 1980s but they are too often performed and interpreted in a variety of ways that are confusing This book answers the pressing need for a guide to the basic principles as well as outlining a set of reliable dependable and accepted practices It is written for geotechnical engineers engineering seismologists and geophysicists as well as academics in these fields *Surface Wave Methods for Near-Surface Site Characterization* Sebastiano Foti,Carlo G. Lai,Glenn J. Rix,Claudio Strobbia,2014-08-21 Develop a Greater Understanding of How and Why Surface Wave Testing Works Using examples and case studies directly drawn from the authors experience Surface Wave Methods for Near Surface Site Characterization addresses both the experimental and theoretical aspects of surface wave propagation in both forward and inverse modeling This book accents the key facets associated with surface wave testing for near surface site characterization It clearly outlines the basic principles the theoretical framework and the practical implementation of surface wave analysis In addition it also describes in detail the equipment and measuring devices acquisition techniques signal processing forward and inverse modeling theories and testing protocols that form the basis of modern surface wave techniques Review Examples of Typical Applications for This Geophysical Technique Divided into eight chapters the book explains surface wave testing principles from data measurement to interpretation It effectively integrates several examples and case studies illustrating how different ground conditions and geological settings may influence the interpretation of data measurements The authors accurately describe each phase of testing in addition to the guidelines for correctly performing and interpreting results They present variants of the test within a consistent framework to facilitate comparisons and include an in depth discussion of the uncertainties arising at each stage of surface wave testing Provides a comprehensive and in depth treatment of all the steps involved in surface wave testing Discusses surface wave methods and their applications in various geotechnical conditions and geological settings Explains how surface wave measurements can be used to estimate both stiffness and dissipative properties of the ground Addresses the issue of uncertainty which is often an overlooked problem in surface wave testing

Includes examples with comparative analysis using different processing techniques and inversion algorithms Outlines advanced applications of surface wave testing such as joint inversion underwater investigation and Love wave analysis Written for geotechnical engineers engineering seismologists geophysicists and researchers Surface Wave Methods for Near Surface Site Characterization offers practical guidance and presents a thorough understanding of the basic concepts

Surface Wave Analysis for Near Surface Applications Giancarlo Dal Moro,2014-11-04 Seismic Wave Analysis for Near Surface Applications presents the foundational tools necessary to properly analyze surface waves acquired according to both active and passive techniques Applications range from seismic hazard studies geotechnical surveys and the exploration of extra terrestrial bodies Surface waves have become critical to near surface geophysics both for geotechnical goals and seismic hazard studies Included in this book are the related theories approaches and applications which the lead editor has assembled from a range of authored contributions carefully selected from the latest developments in research A unique blend of theory and practice the book s concepts are based on exhaustive field research conducted over the past decade from the world s leading seismologists and geophysicists Edited by a geophysicist with nearly 20 years of experience in research consulting and geoscience software development Nearly 100 figures photographs and examples aid in the understanding of fundamental concepts and techniques Presents the latest research in seismic wave characteristics and analysis the fundamentals of signal processing wave data acquisition and inversion and the latest developments in horizontal to vertical spectral ratio HVSR Each chapter features a real world case study 13 in all to bring the book s key principles to life

Advancements in 1D and 2D Near-surface Seismic Site Characterization Using Surface Waves and Full Waveform Inversion Michael Benjamin Schutt Yust,2022 Seismic site characterization is a critical part of understanding earthquake hazards in geotechnical engineering This is often accomplished through various invasive and non invasive methods for measuring shear wave velocity Vs in situ as it is directly related to small strain shear modulus For civil engineering applications the seismic conditions of the near surface top 30 m are of particular interest Surface wave testing has become the tool of choice for many engineers due to its flexibility efficiency and ability to characterize a wide variety of subsurface conditions Surface wave testing is also particularly well suited to near surface imaging due to the prevalence of surface waves within the elastic wavefield at shallow depths Surface wave testing however is not without limitations Inversion of surface wave dispersion data is ill posed and non unique meaning that when it is performed rigorously with full consideration of epistemic uncertainty a potentially large number of reasonable and different 1D Vs profiles are produced This presents a challenge of evaluating which profiles should be used for further analysis or design Additionally engineers often desire information about the lateral variability of seismic parameters in the subsurface but the inherently 1D nature of the processing and inversion techniques used in surface wave testing make acquiring this information challenging Evaluation of lateral variability is generally accomplished through multiple individual 1D surface wave analyses across the site providing

only pseudo 2D information This also introduces a new challenge how to collect the large amount of experimental data required for multiple analyses as the efficiency of traditional surface wave acquisition is limited by the need to physically move geophone arrays with limited numbers of sensors This dissertation discusses these challenges and presents potential solutions through the application of the DeltaVs method distributed acoustic sensing and full waveform inversion Near Surface Geophysics ,2008 **Geotechnical and Geophysical Site Characterization** António Viana da Fonseca,Paul W. Mayne,2004 Soils and rocks are complex natural geomaterials that exhibit a wide range in strength stiffness state of stress structure and flow characteristics Geotechnical Geophysical Site Characterization provides eleven keynote state of the art papers including the Mitchell Lecture A total selection of 219 technical papers and theme reports address methods of site exploration related to ground exploration for civil engineering and construction works These two volumes represent a collection of experience knowledge regarding various methods of in situ testing geophysical techniques innovative devices improved interpretation algorithms and statistical treatment of field data for the characterization of soils rocks and other geomaterials The papers represent the written records and documented efforts from international experts from industry academe and government who participated in the Second International Conference on Site Characterization held in Porto Portugal on September 20 22 2004 Topics include the utilization of rotary drilling sampling and coring techniques Of particular interest is the variety of in situ tests including standard penetration cone penetration flat dilatometer pressuremeter vane shear piezocone dynamic probes and specialized tools as well as geophysical approaches resistivity surveys surface waves crosshole downhole electromagnetic conductivity and ground penetrating radar A careful and proper site evaluation is required in the analysis and design of new structures construction monitoring and forensic studies that require remediation Many of the contributions relate to case studies of projects that involve shallow foundations drilled shafts pilings slope stability excavations earth dams tunnels and mining Several papers discuss a combined approach using multiple methods and or complementary set of geotechnical geophysical tests to ascertain the characteristics of the ground back cover Exploration Geophysics ,2006 **Seismic Site Characterization Techniques Applied to the NATO RSG-11 Test Site in Münster Nord, Federal Republic of Germany** Donald G. Albert,1982 *The Journal of the Acoustical Society of America* Acoustical Society of America,2004 **6th International R&D Conference, Sustainable Development of Water and Energy Resources, Needs and Challenges, 13-16 February 2007, Lucknow, India : Proceedings: Water resources** ,2007 Contributed articles presented at the Conference *Expanded Abstracts with Biographies* ,2000 **Annali Di Geofisica** ,2004 Seismological Research Letters ,2006 **Uncertainty in the Geologic Environment** Charles D. Shackelford,Priscilla P. Nelson,Mary J. S. Roth,1996 Site and Geomaterial Characterization Anand J. Puppala,2006 GSP 149 contains 40 papers on site and geomaterial characterization presented at the GeoShanghai Conference held in Shanghai China June 6 8 2006 Proceedings of the Symposium on the Application of

Geophysics to Engineering and Environmental Problems ,1999 New Methods for Engineering Site Characterization Using Reflection and Surface Wave Seismic Surveys Susit Chaiprakaikeow,2012 This study presents two new seismic testing methods for engineering application a new shallow seismic reflection method and Time Filtered Analysis of Surface Waves TFASW Both methods are described in this dissertation The new shallow seismic reflection was developed to measure reflections at a single point using 2 4 receivers assuming homogeneous horizontal layering Two problems commonly encountered in reflection testing are dealt with in this new method These problems are phase shifts between the wave source and ground motion and loss of high frequency energy Using approaches to mitigate these problems significantly improved the shape of measured waveforms However none of the sites investigated yielded strong enough reflectors to fully characterize the sites TFASW is a new surface Rayleigh wave method to determine the shear wave velocity profile at soil and rock sites The method is an improvement over other surface wave seismic methods because digital filters with optimized bandwidths are used to characterize the surface wave dispersion Successful applications of the TFASW method are shown at three sites **Near-surface Characterization Using Seismic Refraction and Surface-wave Methods** Khaled Al Dulaijan,2008 **Geotechnical Earthquake Engineering and Soil Dynamics III** Robert D. Holtz,American Society of Civil Engineers. Geo-Institute,1998

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