



Soils and Waves: Particulate Materials Behavior, Characterization and Process Monitoring

J. C. Santamarina, Katherine A. Klein, Moheb A. Fam

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Soils are unique materials. Analogous to all other particulate materials, their properties depend on environmental parameters, such as confinement and fluid characteristics. While their behavior is complex, simple micromechanical analyses at the particle level provide unparalleled insight. Furthermore, elastic and electromagnetic waves can be effectively used to gain complementary information about the particulate medium, leading to unique possibilities for studies in engineering and science, including field applications for site assessment and process monitoring. This book is divided into five parts. The first part dwells on the problem of scale and includes a general introduction to materials. In the second part, the behavior of particulate materials is reviewed, with emphasis on the microscale interpretation of macroscale behavior. Fundamental differences between fine and coarse particulate materials are highlighted. The third and fourth parts center on the propagation of mechanical and electromagnetic waves in particulate materials, addressing phenomena such as stiffness, polarization and losses. These two units include laboratory techniques to measure the elastic and electromagnetic spectral response of particulate materials, and an extensive compilation of experimental data. Finally, the fifth part applies elastic and electromagnetic waves to monitoring process in soils. Emphasis is placed on clear, simple analyses and explanations of complex physical phenomena, making this book ideal for self-study. Furthermore, no other book provides such an in-depth description of soils and their behavior and the interaction of elastic and electromagnetic waves and particulate materials (including material data and experimental methods). Thus, this is an invaluable reference for postgraduates, research scientists and practitioners in geotechnical, civil and environmental engineering, as well as scientists in related areas such as physics, geophysics and materials science.

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