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Nota di contenuto	Title Page; Contents; Preface; Acknowledgments; Chapter 1. Jean Biarez: His Life and Work; 1.1. Early years and arrival in Grenoble; 1.2. From Grenoble to Paris; 1.3. The major research interests of Jean Biarez; 1.4. Research and teaching; 1.5. Conclusion; Chapter 2. From Particle to Material Behavior: the Paths Chartered by Jean Biarez; 2.1. Introduction; 2.2. The available tools, the variables analyzed and limits of the proposed analyses; 2.3. Analysis of geometric anisotropy; 2.4. Analysis of the distribution of contact forces in a granular material; 2.5. Analysis of local arrays 2.6. Particle breakage 2.7. Conclusion; 2.8. Bibliography; Chapter 3. Granular Materials in Civil Engineering: Recent Advances in the Physics of Their Mechanical Behavior and Applications to Enginee; 3.1. Behavior resulting from energy dissipation by friction; 3.1.1. Introduction; 3.1.2. Fundamentals; 3.1.3. Main practical consequences; 3.1.4. Conclusions; 3.2. Influence of grain breakage on the behavior of granular materials; 3.2.1. Introduction to the grain breakage phenomenon; 3.2.2. Scale effect in shear strength; 3.3. Practical applications to construction design 3.3.1. A new method for rational assessment of rockfill shear strength

envelo 3.3.2. Incidence of scale effect on rockfill slope stability; 3.3.3. Scale effects on deformation features; 3.4. Conclusions; 3.5. Bibliography; Chapter 4. Waste Rock Behavior at High Pressures: Dimensioning High Waste Rock Dumps; 4.1. Introduction; 4.2. Development of new laboratory equipment for testing coarse materials; 4.2.1. Triaxial and oedometric equipment at the IDIEM; 4.3. Mining rock waste; 4.3.1. In situ grain size distribution; 4.3.2. Analyzed waste rock 4.4. Characterization of mechanical behavior of the waste rock 4.4.1. Oedometric tests; 4.4.2. Triaxial tests; 4.4.3. Oedometric test results; 4.4.4. Triaxial test results; 4.5. Evolution of density; 4.6. Stability analysis and design considerations; 4.7. Operation considerations; 4.7.1. Basal drainage system; 4.7.2. Water management; 4.7.3. Foundation conditions; 4.7.4. Effects of rain and snow; 4.7.5. Effects of in situ leaching on waste rock; 4.7.6. Designing for closure; 4.8. Conclusions; 4.9. Acknowledgements; 4.10. Bibliography Chapter 5. Models by Jean Biarez for the Behavior of Clean Sands and Remolded Clays at Large Strains 5.1. Introduction; 5.2. Biarez's model for the oedometer test; 5.3. Perfect plasticity state and critical void ratio; 5.4. Normally and over consolidated isotropic loading; 5.4.1. Analogy between sands and clays; 5.4.2. Normally consolidated state (ISL); 5.4.3. Overconsolidated state (Cs); 5.5. The drained triaxial path for sands and clays; 5.5.1. The reference behavior; 5.5.2. The mathematical model; 5.6. The undrained triaxial path for sands 5.6.1. Simplified Roscoe formula for undrained consolidated soils

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## Sommario/riassunto

This book addresses the latest issues in multiscale geomechanics. Written by leading experts in the field as a tribute to Jean Biarez (1927-2006), it can be of great use and interest to researchers and engineers alike. A brief introduction describes how a major school of soil mechanics came into being through the exemplary teaching by one man. Biarez's life-long work consisted of explaining the elementary mechanisms governing soil constituents in order to enhance understanding of the underlying scientific laws which control the behavior of constructible sites and to incorporate these scient

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