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trials; 1.4.1. Which law of erosion?; 1.4.2. Concentrated leak erosion; 1.4.3. Backward erosion; 1.4.4. Contact erosion; 1.4.5. Suffusion; 1.5. Remarks on the applicability of erosion trials; 1.5.1. Problem of passing on the results from the laboratory to the hydraulic structure; 1.5.2. Scaling effect of outflows in the absence of similarity 1.5.3. Influence of the geostatic structure of the soil on the erosion threshold 1.5.4. Initiation of internal erosion in a cohesionless soil; 1.5.5. Erodibility and researching erosion laws; 1.6. Conclusion; 1.7. Bibliography; Chapter 2. Suffusion, Transport and Filtration of Fine Particles in Granular Soil; 2.1. Introduction; 2.1.1. Chapter objectives; 2.1.2. Terminology; 2.2. Dominant parameters that influence suffusion; 2.2.1. Parameters that modify the geometry of the porous medium; 2.2.2. Parameters that modify the physicochemical characteristics of the medium 2.3. Main initiation criteria for suffusion 2.3.1. Grain-size distribution criteria; 2.3.2. Confronting granular criteria; 2.3.3. Hydraulic criteria; 2.3.4. Summary and final remarks; 2.4. An initiation criterion formulated using a geohydromechanical approach; 2.4.1. Geometric criterion; 2.4.2. The hydromechanical criterion; 2.4.3. Summary and final remarks; 2.5. The scaling effect and the energetic approach; 2.5.1. Identifying the scaling effect; 2.5.2. Energetic approach; 2.5.3. Summary; 2.6. Coupling the phenomena of suffusion and filtration-clogging; 2.7. Processes causing filtration 2.7.1. Background knowledge 2.7.2. Theoretical background; 2.8. Filtration modeling; 2.8.1. Modeling in a continuous medium; 2.8.2. Convection model - dispersion with deposition kinetics; 2.9. Confrontation between the laboratory filtration tests and the modeling; 2.9.1. Validation of the model in the case of suspended particles; 2.9.2. Results and preferential flow; 2.10. Filtration and clogging; 2.10.1. Phenomenological laws; 2.10.2. Physicochemical aspects; 2.10.3. Filtration and clogging; 2.11. Conclusion; 2.12. Bibliography; Chapter 3. The Process of Filtration in Granular Materials 3.1. Introduction

Sommario/riassunto

This book aims to deliver significant scientific progress on the problem of the erosion of geomaterials, focusing on the mechanical/physical aspect. The chapters oscillate between a phenomenological outlook that is well grounded in experiments, and an approach that can offer a modeling framework. The basic mechanisms of internal and surface erosion are tackled one-by-one: filtration, suffusion, contact erosion, concentrated leak erosion, sediment and wind transport, bedload transport. These erosion mechanisms comprise both hydraulic structures (dams, dikes) and natural environments (wi