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2.5 Final Remarks2.6 Acknowledgments; References; 3 Bone as a Composite Material; 3.1 Introduction; 3.2 Bone Phases; 3.2.1 Organic; 3.2.2 Mineral; 3.2.3 Physical Structure of Bone Material; 3.2.4 Water; 3.3 Bone Phase Material Properties; 3.3.1 Organic Matrix; 3.3.2 Mineral Phase; 3.3.3 Water; 3.3.4 Elastic Modulus of Composite Materials; 3.4 Bone as a Composite: Macroscopic Effects; 3.5 Bone as a Composite: Microscale Effects; 3.6 Bone as a Composite: Anisotropy Effects; 3.7 Bone as a Composite: Implications; References
4 Mechanobiological Models for Bone Tissue. Applications to Implant Design4.1 Introduction; 4.2 Biological and Mechanobiological Factors in Bone Remodeling and Bone Fracture Healing; 4.2.1 Bone Remodeling; 4.2.2 Bone Fracture Healing; 4.3 Phenomenological Models of Bone Remodeling; 4.4 Mechanistic Models of Bone Remodeling; 4.5 Examples of Application of Bone Remodeling Models to Implant Design; 4.6 Models of Tissue Differentiation. Application to Bone Fracture Healing; 4.7 Mechanistic Models of Bone Fracture Healing
4.8 Examples of Application of Bone Fracture Healing Models to Implant Design

Sommario/riassunto

This monograph assembles expert knowledge on the latest biomechanical modeling and testing of hard tissues, coupled with a concise introduction to the structural and physical properties of bone and cartilage. A strong focus lies on the current advances in understanding bone structure and function from a materials science perspective, providing practical knowledge on how to model, simulate and predict the mechanical behavior of bone. The book presents directly applicable methods for designing and testing the performance of artificial bones and joint replacements, while addressing innovative