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Information Extraction from the Surface EMG Signal: High-Density Surface EMG; 5.1 Introduction; 5.2 Spatial Distribution of EMG Potential and EMG Features in Muscles with Fibers Parallel to the Skin; 5.3 Spatial Distribution of EMG Potential and Features in Pinnate Muscles; 5.4 Current Applications and Future Perspectives of HDsEMG; References; Chapter 6: Muscle Coordination, Motor Synergies, and Primitives from Surface EMG; 6.1 Introduction
6.2 Muscle Synergies and Spinal Maps6.3 Muscle Synergies in Posture Control; 6.4 Modular Control of Arm Reaching Movements; 6.5 Motor Primitives in Human Locomotion; 6.6 Conclusions; References; Chapter 7: Surface EMG Decomposition; 7.1 Introduction; 7.2 EMG Mixing Process; 7.3 EMG Decomposition Techniques; 7.4 Validation of Decomposition; References; Chapter 8: EMG Modeling and Simulation; 8.1 Introduction; 8.2 Principles of Modeling and Simulation; 8.3 Phenomenological Surface EMG Models; 8.4 Structure-Based Surface EMG Models; 8.5 Modeling the Action Potential Source
8.6 Models of Volume Conduction and Detection Systems8.7 Models of the Surface EMG Signal; 8.8 Model Validation; 8.9 Applications of Modeling; 8.10 Conclusions; References; Chapter 9: Electromyography-Driven Modeling for Simulating Subject-Specific Movement at the Neuromusculoskeletal Level; 9.1 Introduction; 9.2 Motion Capturing and Biomechanical Modeling of the Human Body; 9.3 Musculoskeletal Modeling; 9.4 EMG-Driven Musculoskeletal Modeling and Simulation; 9.5 Experimental Results and Applications; 9.6 Conclusions; Acknowledgment; References

Sommario/riassunto

Reflects on developments in noninvasive electromyography, and includes advances and applications in signal detection, processing, and interpretation The book presents a quantitative approach to the study and use of noninvasively detected electromyographic (EMG) signals, as well as their numerous applications in various aspects of the life sciences. Surface Electromyography: Physiology, Engineering, and Applications is an update of Electromyography: Physiology, Engineering, and Noninvasive Applications (Wiley-IEEE Press, 2004) and focuses on the developments that have taken place over the last decade. The first nine chapters deal with the generation, detection, understanding, interpretation, and modeling of EMG signals. Detection technology, with particular focus on EMG imaging techniques that are based on two-dimensional electrode arrays are also included in the first half of the book. The latter 11 chapters deal with applications, which range from monitoring muscle fatigue, electrically elicited contractions, posture analysis, prevention of work-related and child-delivery-related neuromuscular disorders, ergonomics, movement analysis, physical therapy, exercise physiology, and prosthesis control. . Addresses EMG imaging technology together with the issue of decomposition of surface EMG. Includes advanced single and multi-channel techniques for information extraction from surface EMG signals. Presents the analysis and information extraction of surface EMG at various scales, from motor units to the concept of muscle synergies. The book is aimed primarily to biomedical engineers, rehabilitation physicians, and movement scientists. However, it may be appreciated by neurophysiologists, and physical and occupational therapists with a background in physics, engineering, and signal processing.