



## Modeling, Simulation and Optimization of Bipedal Walking (Cognitive Systems Monographs)

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The model-based investigation of motions of anthropomorphic systems is an important interdisciplinary research topic involving specialists from many fields such as Robotics, Biomechanics, Physiology, Orthopedics, Psychology, Neurosciences, Sports, Computer Graphics and Applied Mathematics. This book presents a study of basic locomotion forms such as walking and running is of particular interest due to the high demand on dynamic coordination, actuator efficiency and balance control. Mathematical models and numerical simulation and optimization techniques are explained, in combination with experimental data, which can help to better understand the basic underlying mechanisms of these motions and to improve them. Example topics treated in this book are

- Modeling techniques for anthropomorphic bipedal walking systems
- Optimized walking motions for different objective functions
- Identification of objective functions from measurements
- Simulation and optimization approaches for humanoid robots
- Biologically inspired control algorithms for bipedal walking
- Generation and deformation of natural walking in computer graphics
- Imitation of human motions on humanoids
- Emotional body language during walking
- Simulation of biologically inspired actuators for bipedal walking machines
- Modeling and simulation techniques for the development of prostheses
- Functional electrical stimulation of walking.

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