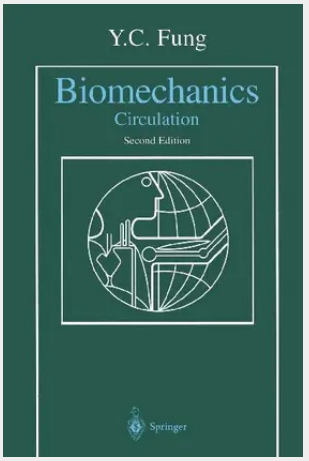
Fung

Biomechanics

Circulation



The theory of blood circulation is the oldest and most advanced branch of biomechanics, with roots extending back to Huangti and Aristotle, and with contributions from Galileo, Santori, Descartes, Borelli, Harvey, Euler, Hales, Poiseuille, Helmholtz, and many others. It represents a major part of humanity's concept of itself. This book presents selected topics of this great body of ideas from a historical perspective, binding important experiments together with mathematical threads. The objectives and scope of this book remain the same as in the first edition: to present a treatment of circulatory biomechanics from the stand points of engineering, physiology, and medical science, and to develop the subject through a sequence of problems and examples. The name is changed from Biodynamics: Circulation to Biomechanics: Circulation to unify the book with its sister volumes, Biomechanics: Mechanical Properties of Living Tissues, and Biomechanics: Motion, Flow, Stress, and Growth. The major changes made in the new edition are the following: When the first edition went to press in 1984, the question of residual stress in the heart was raised for the first time, and the lung was the only organ analyzed on the basis of solid morphologic data and constitutive equations. The detailed analysis of blood flow in the lung had been done, but the physiological validation experiments had not yet been completed.

Biomechanics: Circulation continues Y.C. Fung's acclaimed discussion of physiology, presenting the mechanical aspects of circulation in terms as precise as those of physics. Fung uses a mathematical approach to formulate problems in experimental exploration, data collection, model experiments, in vivo observations, and theoretical ideas. This book discusses the physics of the heart, arteries, veins, microcirculation, and pulmonary blood flow, with a focus on the coupling of fluids and solids in these organs. The second edition adds new chapters on coronary blood flow and blood flow in skeletal muscle.

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