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Applications of Numerical Simulations in Hemodynamic and Biomechanics

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Message from the Guest Editors

Hemodynamics refers to the study of the dynamics of blood flow and its effect on the arterial structure in the circulation system. The circulation system consists of the heart (ventricles and atriums) and the extensive branches of blood vessels, including arteries, veins, and capillaries. The interaction between blood flow and deformation of arterial structure investigated by hemodynamics provides compressive information of the circulation system and guidance to diagnose diseases of the cardiovascular system. Hemodynamics also can be employed to design and evaluate novel treatment devices such as stents, stents graft, and artificial heart valves.

The biological system can be represented using lumped parameters models or a detailed distributed system. Distributed systems can capture all the mechanisms within the system, but they have a much higher computational cost and require the definition of many parameters. Recent progress in AI algorithms has made it possible to overcome these issues by improving the representativeness of lumped parameters models and simplifying the complexity of distributed models.

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Message from the Editor-in-Chief

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