Special Issue "Recent Advances in the Application of Mathematical and Computational Models in Biomedical Science and Engineering 2.0"

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Special Issue Information

Mathematical modeling in biomedical engineering plays a vital role in understanding complex multidisciplinary interactions and processes at the organ, tissue, and cellular scales. Mathematical modeling serves as a low-cost but powerful alternative for optimizing, predicting, and improving existing healthcare protocols, systems, and equipment. This Special Issue aims at collecting original research articles related to the advancement and development of novel mathematical models broadly applied across a wide range of biomedical engineering and medical physics, including diagnostic, therapeutic, imaging, and interventional applications. Review articles pertaining to the overall scope of this Issue are also welcome.

Topics of particular interest include, but are not limited to:

- Coupled multiphysics and multiscale models in bioengineering and biomedicine;

- Bioheat models and thermography;

- Models for cancer theranostics;

- Patient-specific models;

- Dynamic and network models (e.g., regulatory, metabolic, brain networks, etc.);

- Machine learning and multiscale modeling in the biological, biomedical, and behavioral sciences;

- Synthetic biology and its applications;

- Mathematical approaches for regenerative medicine;

- Hemodynamics and drug delivery models;

- Computational neuroscience and neuroengineering, data-driven approaches in multidisciplinary neuroscience;

- Numerical methods and algorithms in the biomedical engineering;

- Computational and systems biology;

- Computational biomechanics;

- Reduced-order models;

- Biomedical simulation and high-performance computing.

Much of the recent advances in applying mathematical and computational models in biomedical science and engineering come from the ideas generated in the Coupled Complex Systems and Networks community. This latter topic has been one of the main themes of the latest edition of the International AMMCS Conference held in Waterloo, Canada, with a special interdisciplinary symposium devoted to this topic (http://ammcs.wlu.ca/2023/special-sessions/ccsms/). Manuscripts covering the areas of coupled complex systems and networks with their applications to biomedical science and engineering will be particularly welcome to this special issue of Bioengineering.

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Guest Editors