

Preface

One of the greatest challenges facing the computational engineering community is to extend the success of computational mechanics to fields outside traditional engineering, in particular to biology, the biomedical sciences, and medicine.

We now live in an era where advances in computing and engineering technology have revolutionized many areas of healthcare, with an abundance of opportunities still available for further progression. Computer-Integrated Surgery (CIS) is no longer regarded as science fiction, with sophisticated systems in place throughout the world. It is envisaged that over the next 20 years the impact of CIS on medicine will be as big as that of Computer-Integrated Manufacturing (CIM) on industrial production in the past 20 years.

Additionally, more applications of Patient-Specific Modelling (PSM) in both health and disease are appearing in the literature. Interestingly, these reports are no longer solely from the computational modelling community, but are now also from clinical researchers harnessing the potential of PSM. There is still much work to do in this area, including robust validation before we can translate our methods to the clinic. However, the shift towards complete personalized computational medicine is gaining momentum.

The Computational Biomechanics for Medicine book series was initiated by the Intelligent Systems for Medicine Laboratory and the Auckland Bioengineering Institute. This fifth edition of the series comprises nine of the latest developments in both fundamental science and patient-specific applications, from researchers in Australia, New Zealand, the USA, the UK, France, Ireland, and China. Some of the interesting topics discussed are:

- Cellular mechanics
- Tumor growth and modelling
- Medical image analysis
- Patient-specific fluid dynamics and solid mechanics

The Computational Biomechanics for Medicine book series not only provides the community with a snapshot of the latest state of the art, but importantly, when

CIS and PSM are mainstays of healthcare, it will serve as a key reminder of how the field has developed over the years.

We would like to thank the authors for submitting high-quality work and the reviewers for helping with paper selection.

We hope you enjoy this year's edition.

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Fundamental Science and Patient-specific Applications

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