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CLINICAL APPLICATIONS OF COMPUTATIONAL BIOMECHANICS

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MINI-SYMPOSIUM PROPOSAL

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Computational biomechanics, especially those using patient-specific information, has approximately 2 decades of history pursuing contributions to clinical medicine. Continuous effort has been made in developing models for better representation of human physiology and faster computation, and also thanks to advancement of computer hardware, computational biomechanics has now direct clinical applications in diagnosis as well as treatment optimization, including success in commercialization. As a result, computational biomechanics has drawn a significant attention in clinical community as a tool to add value to the data acquired in routine clinical practice such as CT, MR images or catheter recording. In this context, computational biomechanics is used as a method of 'non-invasive measurement tool' and has been utilised in large cohort study led by a large group of clinicians. This nonetheless suggests that the time has come for the engineers to make a larger impact on the healthcare. However, unique challenges are involved in clinical applications of computational approach, such as to determine the right level of model approximation to answer the clinical question with sufficient accuracy and shortest timescale. At the same time, the technology advancement allows challenges for increasingly complex models such as whole heart simulation.

This mini-symposium is aimed at discussing next steps for the engineers to take, in order for more impactful contribution to the clinical practice, based on the current state-of-the-art examples. To achieve this, experts in applying computational approaches to address clinical questions will be invited to discuss the challenges they are facing. We expect, at the end, the presenters and participants to have ideas how the next level of clinical applications should look like and what technological breakthrough will be required. Key questions are: how fast can we compute and how complex should we go? The talks may be focused on the following specific topics.

- Methods to handle large patient cohort in clinical trials;
- Challenges towards more physiologically representative modelling;
- Challenges towards reduced order models;

We propose this mini-symposium to consist of 2 sessions of 5-6 talks in each.