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Nota di contenuto	Intro -- Preface -- Acknowledgements -- Contents -- Chapter 1 A Pipeline for Automated Coordinate Assignment in Anatomically Accurate Biventricular Models -- 1.1 Introduction -- 1.2 Methods -- 1.2.1 Semi-Automated Surface Extraction -- Algorithm 1 -- 1.2.2 Biventricular Coordinate System -- 1.2.2.1 Creation of the Coordinate System Cobiveco -- 1.2.3 Mapping Vector Fields -- 1.3 Results -- 1.4 Conclusion -- 1.4.1 Limitations -- References -- Chapter 2 3D Simulations of Fetal and Maternal Ventricular Excitation for Investigating the Abdominal ECG -- 2.1 Introduction -- 2.2 Methods 2.2.1 Geometrical mesh construction -- 2.2.2 Electrophysiological modelling -- 2.2.3 Extracellular potential measurements -- 2.2.4 Fetal ECG extraction using signal processing methods -- 2.3 Results -- 2.4 Discussion -- 2.5 Conclusions -- References -- Chapter 3 Ordinary Differential Equation-based Modeling of Cells in Human Cartilage -- 3.1 Introduction -- 3.2 Methods -- 3.2.1 Mathematical modelling of ATP-sensitive K+ currents -- 3.2.2 Population of Models -- 3.3 Results -- 3.3.1 Validation -- 3.3.2 Results for the ATP-sensitive K+ currents

Sommario/riassunto

This open access volume compiles student reports from the 2021 Simula Summer School in Computational Physiology. Interested readers will find herein a number of modern approaches to modeling excitable tissue. This should provide a framework for tools available to model subcellular and tissue-level physiology across scales and scientific questions. In June through August of 2021, Simula held the seventh annual Summer School in Computational Physiology in collaboration with the University of Oslo (UiO) and the University of California, San Diego (UCSD). The course focuses on modeling excitable tissues, with a special interest in cardiac physiology and neuroscience. The majority of the school consists of group research projects conducted by Masters and PhD students from around the world, and advised by scientists at Simula, UiO and UCSD. Each group then produced a report that addreses a specific problem of importance in physiology and presents a succinct summary of the findings. Reports may not necessarily represent new scientific results; rather, they can reproduce or supplement earlier computational studies or experimental findings. Reports from eight of the summer projects are included as separate chapters. The fields represented include cardiac geometry definition (Chapter 1), electrophysiology and pharmacology (Chapters 2–5), fluid mechanics in blood vessels (Chapter 6), cardiac calcium handling and mechanics (Chapter 7), and machine learning in cardiac electrophysiology (Chapter 8).