

Preface

Over the years, flow visualization techniques have been applied in an effort to make the invisible visible with the help of experimental and computational technology. These tools have become indispensable to understand, and be able to control, the flow behavior of different types of complex biological fluids (e.g., DNA solutions, microorganisms, blood, and other physiological fluids) in living systems and biomedical devices. This book focuses on the most recent advances in visualization and simulation methods to understand the flow behavior of complex fluids used in biomedical engineering and other related fields, including mechanical, chemical, and materials engineering. It considers the physiological flow behavior in large arteries, microcirculation, respiratory systems, and in biomedical microdevices.

This book is aimed mainly at graduate students and researchers in the field of bioengineering seeking to provide a better understanding of the current state of the art and hopefully encourage the readers to grow their understanding beyond the specific topics addressed here. The book is composed of 13 chapters organized into three main sections. The first section of the book presents numerical studies on the hemodynamics at the macro-scale level. The second part covers *in vivo*, numerical, and *in vitro* studies applied to hemodynamics at the micro- and cellular-scale. The last part of the book addresses the study of ciliary flow by using both numerical and *in vivo* methods.

Rui Lima
Takuji Ishikawa
Yohsuke Imai
Mónica S. N. Oliveira

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