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Lisa J. Fauci      Shay Gueron  
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# Computational Modeling in Biological Fluid Dynamics

With 93 Illustrations



Springer

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## FOREWORD

This IMA Volume in Mathematics and its Applications

### COMPUTATIONAL MODELING IN BIOLOGICAL FLUID DYNAMICS

is based on the proceedings of a very successful workshop with the same title. The workshop was an integral part of the September 1998 to June 1999 IMA program on "MATHEMATICS IN BIOLOGY." I would like to thank the organizing committee: Lisa J. Fauci of Tulane University and Shay Gueron of Technion - Israel Institute of Technology for their excellent work as organizers of the meeting and for editing the proceedings.

I also take this opportunity to thank the National Science Foundation (NSF), whose financial support of the IMA made the Mathematics in Biology program possible.

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## PREFACE

A unifying theme in biological fluid dynamics is the interaction of moving, elastic boundaries with a surrounding fluid. A complex dynamical system describes the motion of red blood cells through the circulatory system, the movement of spermatazoa in the reproductive tract, cilia of microorganisms, or a heart pumping blood. The revolution in computational technology has allowed tremendous progress in the study of these previously intractable fluid-structure interaction problems.

This volume contains invited and refereed papers based upon presentations given in the IMA workshop on “Computational Modeling in Biological Fluid Dynamics” during January of 1999. This workshop brought together biologists, zoologists, engineers, and mathematicians working on a variety of issues in biological fluid dynamics. It was a lively forum where new developments in numerical methods, modeling, and experimental results were shared. It is our hope that this collection will allow others to become aware of and interested in the exciting accomplishments and challenges uncovered during this workshop.

As the organizers, it is our pleasant duty to thank the IMA for the workshop. It was a success in all respects: friendly atmosphere, high quality talks, fruitful scientific interactions, and extraordinary logistics. We were extremely impressed by the friendliness, efficiency and resourcefulness of the entire IMA staff. Their meticulous and professional organization contributed immensely to the smooth operation during the week of the workshop. In particular, we would like to acknowledge the important contributions of Dr. Fred Dulles to the success of the workshop.

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Shay Gueron  
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