

A THESIS ON
THEORETICAL STUDIES ON FLOW PROBLEMS IN
PHYSIOLOGICAL FLUID DYNAMICS

By

ANIL KUMAR

Centre for Atmospheric and Fluids Sciences,
Indian Institute of Technology, New Delhi

Submitted to the Indian Institute of Technology, Delhi
for the award of the Degree of Doctor of Philosophy

1981

DEDICATED TO MY PARENTS

ACKNOWLEDGEMENTS

I am grateful to Professor M.P. Singh who gave me the opportunity to undertake this research work and inspired me by his deep theoretical insight and acumen that often flows from study and work mixed together. Also, I wish to express my deepest gratitude to Dr. (Mrs.) Girija Jayaraman for her efforts to provide me with a constructive and valuable guidance and useful discussions at every stage of the work carried out in the thesis.

I shall be failing in my duty if I omit to record my sense of obligations to Mrs. Uma Singh for her inspiration. I would also like to thank Dr. V.B. Sarin for his cooperation.

I must express a final word of thanks to Miss Neelam Dhody for her neat and clean typing.

(ANIL KUMAR)

C O N T E N T S

Page No.

SYNOPSIS

PART - A

Introduction	..	1 - 16
1. Entry flow in a curved tube with torsion	..	17 - 48
2. Reversing flow in a curved tube with applicationsto flow in the aorta	..	49 - 79
3. Developing flow in than walled elastic tubes with applications to blood flow in arteries.	..	80 - 97
References	..	98 - 104

P A R T - B

Introduction	..	105 - 108
1. Theoretical study of oxygen transfer in membrane oxygenators	..	109 - 130
2. Oxygen transfer in capillary Membrane oxygenator	..	131 - 144
References	..	145 - 149