

Preface

The objective of this book is to provide a comprehensive discussion of Fourier and Chebyshev spectral methods for the computation of incompressible viscous flows, based on the Navier-Stokes equations.

For reasons of efficiency and confidence in the numerical results, the researchers and practitioners involved in computational fluid dynamics must be able to master the numerical methods they use. Therefore, in writing this book, beyond the description of the algorithms, I have also tried to provide information on the mathematical and computational, as well as implementational characteristics of the methods.

The book contains three parts. The first is intended to present the fundamentals of the Fourier and Chebyshev methods for the solution of differential problems. The second part is entirely devoted to the solution of the Navier-Stokes equations, considered in vorticity-streamfunction and velocity-pressure formulations. The third part is concerned with the solution of stiff and singular problems, and with the domain decomposition method.

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