

## Computational Spectral Methods

Spectral methods have become increasingly popular in recent years, especially since the development of fast transforms with problems where high accuracy is desired for complicated problems. This monograph discusses the spectral methods and their use in fluid mechanics. A fast and accurate spectral algorithm is presented for the solution of the 1-D diffusion equation. The mathematical treatment in this algorithm leads to a system of O.D.E's that has well-known simple analytical solution. The same spectral approach is used to solve the 2-D Poisson's equation spectrally. The proposed algorithm leads to a nonconventional system of linear equations that opposite to what is known. This system is solved using a deduced block matrix technique. Finally, the author presents an important application in fluid mechanics through introducing the spectral solution of inviscid incompressible fluid flow using velocity- stream function formulation. The numerical results in this monograph are very accurate and identical to the analytical ones.



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Computational Spectral Methods



**Abdallah Mostafa**

## Computational Spectral Methods

Basics, Concepts, Applications

Monograph

# Spectral Methods And Their Applications

**Camilla Rothe**



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