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Solution Procedure: Block Incomplete Decomposition -- 7.1 Properties and Advantages of the Block Matrix -- 7.2 General Incomplete Decomposition -- 7.3 An Incomplete Decomposition of the Block System (BIP) -- 7.4 The Block Solution Procedure -- 7.5 Complete Solution of the Flow Field -- 7.6 A Family of Procedures: BIPEN, FICS-1, FICS-2 -- 7.7 Storage Requirements and Complexity -- 7.8 The Simplest Case (Simple Implicit Coupled Solution- SICS) -- Chapter 8 Applications And Testing -- 8.1 Benchmark Fluid Flow Problems -- 8.2 Testing Criteria -- 8.3 Performance Analysis and Comparisons -- 8.4 A Discussion of the Mechanism of the Procedures -- 8.5 Comparison with the Segregated-Type Procedures -- 8.6 Convergence Characteristics and Performances of SICS and SIMPLER: A Relative Comparison -- Chapter 9: Special Cases -- 9.1 Time-Dependent Problems -- 9.2 Stoke's Flow Equations -- 9.3 Turbulent Flows and Heat Transfer -- 9.4 Adaptation to Existing Codes -- 9.5 Three-Dimensional Problems -- Chapter 10 Concluding Remarks -- Appendix A: A Critical Survey of Literature—an Adventure Into Perfection -- Appendix B: Segregated Solution Procedures: Simple And Simpler -- Appendix C: Fortran Subroutines — Blocksolfics2 and Blocksolsics -- References -- Nomenclature -- Index.

Sommario/riassunto

This book introduces a new generation of superfast algorithms for the treatment of the notoriously difficult velocity-pressure coupling problem in incompressible fluid flow solutions. It provides all the necessary details for the understanding and implementation of the procedures. The derivation and construction of the fully-implicit, block-coupled, incomplete decomposition mechanism are given in a systematic, but easy fashion. Worked-out solutions are included, with comparisons and discussions. A complete program code is included for faster implementation of the algorithm. A brief literature review of the development of the classical solution procedures is included as well. .