Numerical Computing With Modern Fortran (Applied Mathematics)

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Numerical Computing With Modern Fortran (Applied Mathematics) Richard J. Hanson, Tim Hopkins The Fortran language standard has undergone significant upgrades in recent years (1990, 1995, 2003, and 2008). *Numerical Computing with Modern Fortran* illustrates many of these improvements through practical solutions to a number of scientific and engineering problems.

Readers will discover techniques for modernizing algorithms written in Fortran; examples of Fortran interoperating with C or C++ programs, plus using the IEEE floating-point standard for efficiency; illustrations of parallel Fortran programming using coarrays, MPI, and OpenMP; and a supplementary website with downloadable source codes discussed in the book.

Audience: This book is intended for Fortran programmers seeking to update their programming skills using the language s latest features and for C and C++ programmers who want to understand key software aspects of numerical computing using modern Fortran. It is suitable for an upper-level undergraduate or early graduate course on advanced numerical scientific computing.

Contents: Introduction; Chapter 1: The Modern Fortran Source; Chapter 2: Modules for Subprogram Libraries; Chapter 3: Generic Subprograms; Chapter 4: Sparse Matrices, Defined Operations, Overloaded Assignment; Chapter 5: Object-Oriented Programming for Numerical Applications; Chapter 6: Recursion in Fortran; Chapter 7: Case Study: Toward a Modern QUADPACK Routine; Chapter 8: Case Study: Quadrature Routine qag2003; Chapter 9: IEEE Arithmetic Features and Exception Handling; Chapter 10: Interoperability with C; Chapter 11: Defined Operations for Sparse Matrix Solutions; Chapter 12: Case Study: Two Sparse Least-Squares System Examples; Chapter 13: Message Passing with MPI in Standard Fortran; Chapter 14: Coarrays in Standard Fortran; Chapter 15: OpenMP in Fortran; Chapter 16: Modifying Source to Remove Obsolescent or Deleted Features; Chapter 17: Software Testing; Chapter 18: Compilers; Chapter 19: Software Tools; Chapter 20: Fortran Book Code on SIAM Web Site; Bibliography; Index.

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