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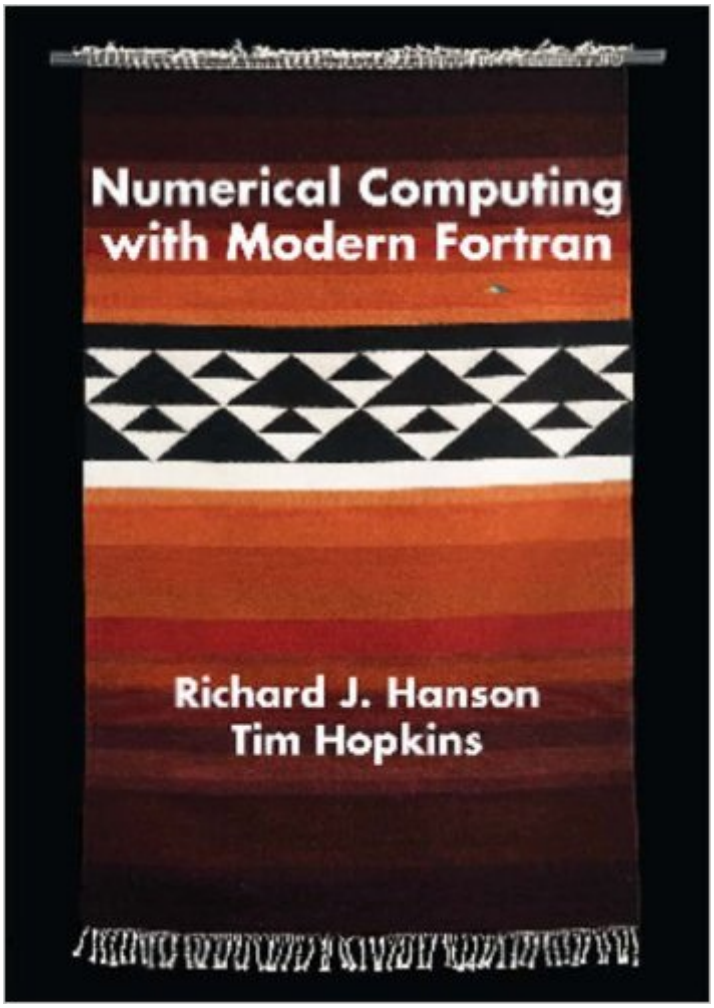
Numerical Computing With Modern Fortran (Applied Mathematics)



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Synopsis

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.

Book Information

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Customer Reviews

I've been seeing a lot of books come out with "Modern Fortran" in the title, which has given me a chuckle. As a former Fortran compiler developer, and current Fortran standards committee member and "evangelist" on behalf of my employer, I see a lot of programmers who learned Fortran back in the 80s and 70s (and even 60s) who need help understanding all that Fortran 2008, the most recent standard, brings to the table. While there are lots of books that are references, or that try to teach the entire language from scratch, there aren't many that take the approach that Hanson and Hopkins did with "Numerical Computing With Modern Fortran."I've known Dr. Hanson professionally for a number of years, and he sent me a copy of the book as a professional courtesy. He didn't ask me to review it, but after reading it I am delighted to do so as I will be recommending it to my own customers. If you're not a mathematician, don't let the title scare you. While Hanson and Hopkins do use popular mathematical algorithms to illustrate how to use modern Fortran, the bulk of the book is aimed at bringing the FORTRAN IV or FORTRAN 77 programmer up to speed with Fortran 2008. Topics covered include free-form source, modules, generic procedures, object-oriented programming and recursion, all things completely absent from older versions of the language. These are presented in an incremental fashion, with lots of small examples that illustrate the benefits and proper usage of the new features. The tone is friendly and approachable, and it is chock full of advice I completely agree with.

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