Sinc Methods for Quadrature and Differential Equations

By John Lund, Kenneth L. Bowers

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Here is an elementary development of the Sinc-Galerkin method with the focal point being ordinary and partial differential equations. This is the first book to explain this powerful computational method for treating differential equations. These methods are an alternative to finite difference and finite element schemes, and are especially adaptable to problems with singular solutions. The text is written to facilitate easy implementation of the theory into operating numerical code. The authors' use of differential equations as a backdrop for the presentation of the material allows them to present a number of the applications of the sinc method. Many of these applications are useful in numerical processes of interest quite independent of differential equations. Specifically, numerical interpolation and quadrature, while fundamental to the Galerkin development, are useful in their own right.

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Review
'This text illustrates the use of Sinc methods for solving differential equation boundary value problems. Sinc methods are not yet as popular as finite difference or finite element methods, mainly because they are less well understood. The present easy-to-understand Lund-Bowers text should go a long way towards making Sinc methods more popular ...The book contains easy-to-understand theorems, many well-selected examples, as well as exercises and illustrations--all designed to make it easy for the student and user to understand Sinc methods for solving differential equations.' Frank Stenger, SIAM Review

'The book gives an elementary development of the methods, provides a good survey of the theory about sinc functions, and is completed by a detailed list of references.' Reinhard Scholz, Mathematical Reviews

"The aim of this well written and clearly printed book is to show how to exploit as fully as possible the potential of the [sinc] method ... Anyone who wishes to look into the sinc method more closely will find a large number of references at the end of each chapter, while the student who wants to learn about the method will find the book a readily accessible account of it.' J.D.P. Donnelly, Zentrablatt fur Mathematik

"This book is well written. The inclusion of proofs in the early chapters, and problems throughout the text, allows it to be used in a graduate-level special topics course. This text also includes over 60 references. Many of these references are to research papers describing the application of sinc methods to approximation, quadrature, and the solution of ordinary and partial differential equations.' W. Ferguson, Computing Reviews

About the Author
John Lund is professor of mathematics in the department of mathematical sciences at Montana State University.

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