PUBLIC ANNOUNCEMENT

The National Institute of Standards and Technology (NIST) seeks proposals from publishers interested in licensing the rights to produce and market a printed version of the NIST Digital Library of Mathematical Functions (DLMF), http://dlmf.nist.gov/. Background information on the DLMF project is found below. Also found below are details of the expected terms of such a license agreement, as well as information on the criteria to be used in the selection process.

Proposals responding to this solicitation must be received by 5:00 pm Eastern time on Friday December 12, 2008. Proposals must be submitted to:

Dr. Daniel Lozier
Mail Stop 8910
National Institute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD 20899-8910
lozier@nist.gov

Submission by email is preferred.

Questions regarding this solicitation must be addressed to Dr. Lozier in writing (e.g., by email). Responses will be posted publicly on the DLMF website.

We expect to make a decision on the licensee within 30 days of the submission deadline.

A. Background Information

The DLMF Project aims to prepare a successor to the highly successful *Handbook of Mathematical Functions*, National Bureau of Standards Applied Mathematics Series 55, 1964, edited by M. Abramowitz and I.A. Stegun. The project was begun in 1999. Funding for the work has been provided by the National Institute of Standards and Technology and the National Science Foundation. A working group of approximately 12 NIST employees and 50 non-NIST authors, and validators, are contributing to the Project under the direction of four Editors. The Editors are Dr. F.W.J. Olver of the University of Maryland and Drs. D.W. Lozier, R.F. Boisvert, and C.W. Clark of NIST. The non-NIST contributors have been compensated under contracts with NIST. The Editors also have been assisted by an uncompensated set of associate editors who were selected because of their research accomplishments. A list of participants in the project can be found on the DLMF web site. A list of chapters with the names of the authors, and a list of authors and validators along with their affiliations, is contained in Attachments 2 and 3 below.

The DLMF provides reference material for an important field of applied mathematics in 36 chapters. Most of these chapters present the essential mathematical properties of special functions, such as Bessel and Legendre functions, together with 2D and 3D color graphics and computational information. Three chapters summarize mathematical topics (algebraic and

analytical methods, asymptotic approximations, and numerical methods) that are essential in serious work with special functions.

The style of the DLMF is similar to that of the original Abramowitz and Stegun Handbook, in which coverage is maximized and exposition is minimized. This approach made the original Handbook immensely valuable to practicing researchers in physics, applied mathematics, and other scientific, technological, and engineering disciplines. It also found widespread acceptance among students in mathematics and the sciences. This same large group of individuals is the target audience for the DLMF.

Abramowitz and Stegun is recognized widely as a best seller among mathematical reference books. It is the all-time best-seller among NBS/NIST technical publications (the National Bureau of Standards was the official name of NIST until 1987). We estimate that more than 1,000,000 copies have been sold. A study conducted at NIST in 1997 demonstrates that the rate of citations increased steadily from 1974 to 1995, with more than 7000 citations during a 5-year period in the mid-1990s. The study has not been extended beyond 1995 but there is no reason to believe the citation rate has declined.

The impressive success of the original Handbook can be attributed to its vast collection of formulas, which were selected with scientific applications in mind. On the other hand, it has never been revised, and so it is badly out of date with respect to the many developments in the theory, application, and computation of special functions that have occurred over the last 40+ years. For example, half its pages are obsolete tables of numerical values of functions. These were useful mainly for computation by interpolation, a method that has been replaced entirely by the availability of mathematical software. Due to the advances in this field over the intervening 40+ years, more than double the number of formulas and graphs will be contained in the DLMF. Nevertheless, by eliminating tables the DLMF is not likely to exceed the size of the original Handbook (1046 pages).

The DLMF is based on an independent and exhaustive survey of the current literature of special functions. The technical material contained in the DLMF was compiled by experts in the field selected by the NIST Editors in consultation with DLMF Associate Editors. Chapters and their revisions submitted by DLMF authors were carefully and extensively edited at NIST by Mathematics Editor F.W.J. Olver. Each chapter was then independently reviewed for correctness by an independent external validator selected by NIST in consultation with its Associate Editors. This formal validation process is another distinctive feature of the DLMF that was not present in the original Abramowitz and Stegun effort. Finally, to ensure uniformity of presentation, all text has been typeset at NIST using a specially designed LaTeX style, and all graphics have been regenerated and re-rendered at NIST.

The DLMF project is constructing a free public Web site that will be maintained permanently by NIST. The Web site will present all the information developed as part of the project, distributed in HTML and other Web-specific formats. In addition the online DLMF will include a search engine, interactive visualizations, a formula downloading capability, as well as Web links to article reviews, full text of articles, and sources of mathematical software.

B. Purpose and Objectives of the Solicitation

The overall objective of this solicitation is to disseminate the results created by the DLMF Project to scientific professionals and students worldwide in a reasonably priced and professionally published print edition. The title of the print edition will be *NIST Handbook of Mathematical Functions* (which we will refer to as HMF below). The complete HMF is expected to be approximately 1,000 pages in length. Note that the same information available in the HMF will also be disseminated in HTML and related Web formats from a free public Web site constructed and maintained by NIST.

More specifically, the objective of this solicitation is to identify a suitable publisher who will be granted a license to:

(1) Publish a high-quality long-lasting hardcover edition.
(2) Publish a CD (or DVD) containing all of the chapters in PDF format for inclusion with the hardcover edition.
(3) Optionally publish alternate editions, e.g., softcover.
(4) Market the editions worldwide to the target audience.

NIST holds copyright to all HMF content and, unlike the original Abramowitz and Stegun Handbook, the copyright will remain with NIST, together with custody of the original computer files, source code, and all rights to Web distribution and design. The license will grant the selected publisher the right to produce a hardcover and mutually-agreed-to alternate editions for a specified period of 5 years. The license is renewable if NIST and the licensee so agree.

NIST intends to collect reports of errors and will revise the Web site and the PDF files accordingly. The revised files will be made available to the licensee for reprinting. NIST also intends to review recommendations for added technical content and reserves the right to augment the Web site at any time. At appropriate times, to be negotiated with the licensee, NIST may develop subsequent editions for distribution by the licensee.

To assist in marketing, NIST will display information about licensed print editions prominently on the DLMF Web site.

C. Selection Criteria

A licensee will be selected on the basis of qualifying criteria and selection criteria. The selection criteria are to be based on a *production plan* and a *marketing plan*, each of which must be submitted as part of the proposal that responds to this solicitation.

The qualifying criteria are:

Q1. Proven success in mathematics book publishing evidenced by provision of representative recent publication lists, advertising copy, and sales data.

Q2. Proven experience with publishing mathematics books in color, evidenced, for example, by provision of a sample of such a book. Color is to be possible on every page.
Q3. Agreement to use a dual-column large-format page size, as close as possible to the original Abramowitz and Stegun Handbook.
Q4. Agreement to produce the hardcover edition, the CD (or DVD) edition, and any alternate editions from PDF files supplied by NIST without alteration by others. The licensee may request alterations, but these must be approved and implemented by NIST.

Prospective licensees who do not satisfy the qualifying criteria will not be included in any further consideration.

The selection factors for the *production plan*, in decreasing order of importance, are:

R1. Format and Quality of the Physical Products (a) Page and column dimensional specifications should be included in the Production Plan. These will be judged relative to the original Abramowitz and Stegun handbook. (b) The paper, binding, and other physical characteristics must be suitable for heavy use by individuals and permanent archiving by libraries.
R2. Production Schedule NIST wishes to have the published HMF available for distribution promptly after the final computer files are provided to the licensee. The production schedule should provide the size of the initial printing and the time required to have the physical products ready for distribution to purchasers.

The selection factors for the *marketing plan*, in decreasing order of importance, are:

R3. Unit Price Low price consistent with high quality is an important ranking factor.
R4. Sales Promotion Relevant here are, for example, plans for advertising, direct marketing, presence in retail bookstores and online booksellers, and presence at major mathematics, physics, and other scientific conferences. Effective plans for global marketing are also important.

An additional selection factor is the following:

R5. Alternate Editions If the proposal includes alternate editions, these will also be judged based on their production and marketing plans as above, as well as their potential for significantly improving access to the technical material being disseminated.

D. License Agreement

Upon selection, a license agreement will be executed between NIST and the licensee. Here we describe the essential elements of this agreement.

The license period will extend from the date of the agreement to 5 years from the date of the agreement. Provision is made for an indefinite number of 5-year renewal periods. One year before the end of every license renewal period the licensee will participate in a license review with NIST. At this review the licensee will inform NIST of its intention to apply for, or not to apply for, approval of a further license period of 5 years, to commence immediately after expiration of the current period. License renewal is subject to acceptance by NIST.

The licensee should carry out its work using normal internal management and control systems found in professional science, technology and medical publishing.

The licensee will be responsible for the following:

(1) Initial Production

a. Cover Design A proposal for cover design is required, and is to be based on the Sample Chapter Collection (see Section E and Attachment 1). The delivery date for the cover design is to be included in the Production Plan.

b. Proposal for CD/DVD Content Design The CD/DVD should have a main page in the form of an html home page readable by standard Web browsers which serves as a table of contents by which the chapter PDF files may be downloaded from the CD/DVD. This page should be designed by the licensee. The delivery date for this proposed web page is to be included in the Production Plan.

c. Initial Recommendations on Presentation Style These recommendations are to be based on a thorough examination of the Sample Chapter Collection, including its bibliography and index. All line-by-line copy-editing will be done by NIST. The purpose of the recommendations is to provide suggestions for general improvement of the presentation and identification of problems that may need addressing in the sample chapters and, by extension, in the whole HMF. All changes will be implemented at NIST. The delivery date for this document is to be included in the Production Plan.

d. Further Recommendations on Presentation Style These recommendations are to be based on a thorough examination of approximately 50% of the Core Material (chapters, bibliography, index). The material for this examination will be provided by NIST in accordance with Section D below. All line-by-line copy-editing will be done by NIST. The purpose of the recommendations is to provide suggestions for general improvement of the presentation and identification of problems that may need addressing in the examined material and, by extension, in the whole HMF. All changes will be implemented at NIST. The delivery date for these recommendations is to be included in the Production Plan.

e. Delivery of Final Proof A complete final proof copy of the HMF will be provided to NIST for inspection before the first printing (or before any subsequent new edition). Copies of the HMF will not be sold by the licensee until the final proof is inspected and approved by NIST. This will also apply to each subsequent edition. NIST will inspect and return the proof within 30 days of receipt.

(2) Initial Printing The size of the initial printing, and date when it is to be completed and ready for distribution, is to be included in the Production Plan.

(3) Reprintings and New Editions These will be produced from updated production-ready PDF files that may be provided by NIST from time to time. NIST will coordinate the provision of any such updated files with the production schedule of the licensee to avoid, for example, excessive inventory of out-of-date printings.

(4) Alternative Editions These may be proposed by the licensee at any time subject to approval and at prices agreed to in advance by NIST.

(5) Copies Provided to NIST. The licensee will provide to NIST eight (8) copies of each edition of the HMF that is published.

(6) Annual Sales Reports Starting one year from the date of the agreement and annually thereafter, the licensee will supply a report on sales to date. The report will include a summary of marketing efforts associated with book undertaken during the past 12 months.

(7) Annual Royalty Payments Starting one year from the date of the agreement and annually thereafter, the licensee will deliver a royalty payment of 10% calculated on the basis of the dollar amount of sales since the previous royalty payment.

(8) Price Increases These cannot exceed 5% per year without the prior approval of NIST.

NIST will be responsible for the following: NIST will furnish PDF files with HMF content according to the following schedule:

(1) 60 Days after Commencement of the Agreement Approximately 50% of the core material (chapters, bibliography, indexes). This is for review and advice to NIST, not for production.

(2) 120 Days after Commencement of the Agreement The entire text for the printed version of the HMF, including all front matter, core material, and back matter.

Attachment 1

Description of Sample Chapter Collection

The Sample Chapter Collection contains 5 chapters of the DLMF. It was prepared at NIST and is provided as a PDF file. The file is in the form of a Mockup Print Edition with a sample title page, copyright page, and table of contents; the current versions of chapters 2, 5, 9, 27, and 34; and the current versions of the bibliography, notations, and index. The table of contents lists all 36 chapters of the DLMF. The bibliography, notations, and index pertain only to the 5 chapters contained in the Sample Chapter Collection.

The Sample Chapter Collection will be provided to prospective licensees on request. Please contact Dr. Daniel Lozier (contact information provided above).

The Mockup Print Edition exhibits several features that will not appear in the published DLMF. These are as follows.

1. The diagonal light gray marking “Preliminary” that appears on every page.
2. The red marking “Preliminary. Not Validated. Do not redistribute or use for citation. Contact daniel.lozier@nist.gov.” that appears on the 5 chapter title pages.
3. The numerous red markings scattered throughout the text that correspond to cross-references to chapters not included in the Sample Chapter Collection. The first two of these, appearing on page 3, are “sec:LE.UAA.LOFD” and “sec:OP.AA.Le”. These are internal labels that will be replaced with page numbers when the full DLMF is generated from the LaTeX source.
4. The red marking “xx” in section 9.3(ii) on page 49. This is a placeholder for a page reference that will refer to the yet-to-be-written introduction for the print edition of the DLMF.

Notes on Color:

1. The colors of the lines in the 2D line graphs are present as an aid to distinguishing the lines.
2. The colors in the 3D surface graphs are present in some cases as an aid to perception of height, and in other cases to represent mathematical information such as the phase of a complex function.
3. The color used for the text of chapter titles, major unnumbered headings within chapters, and occasional horizontal rules is present as a presentational element.
4. NIST requests recommendations on the selection of individual colors, and on the use of color in general, from prospective licensees.

Attachment 2

Chapters and Authors for the Handbook of Mathematical Functions

Chapter 1. *Algebraic and Analytic Methods*
R. Roy, F. W. J. Olver, R. A. Askey, and R. Wong

Chapter 2. *Asymptotic Approximations*
F. W. J. Olver and R. Wong

Chapter 3. *Numerical Methods*
N. M. Temme

Chapter 4. *Elementary Functions*
R. Roy and F. W. J. Olver

Chapter 5. *Gamma Function*
R. A. Askey and R. Roy

Chapter 6. *Exponential, Logarithmic, Sine and Cosine Integrals*
N. M. Temme

Chapter 7. *Error Functions, Dawson's and Fresnel Integrals*
N. M. Temme

Chapter 8. *Incomplete Gamma and Related Functions*
R. B. Paris

Chapter 9. *Airy and Related Functions*
F. W. J. Olver

Chapter 10. *Bessel Functions*
F. W. J. Olver and L. C. Maximon

Chapter 11. *Struve and Related Functions*
R. B. Paris

Chapter 12. *Parabolic Cylinder Functions*
N. M. Temme

Chapter 13. *Confluent Hypergeometric Functions*
A. B. Olde Daalhuis

Chapter 14. *Legendre and Associated Legendre Functions*
T. M. Dunster

Attachment 3

Affiliations of Chapter Authors and Validators

George E. Andrews
Department of Mathematics
Pennsylvania State University

Tom M. Apostol
Department of Mathematics
California Institute of Technology

Richard A. Askey
Department of Mathematics
University of Wisconsin, Madison

A. Ross Barnett
Department of Engineering Mathematics (retired)
University of Bristol, UK

Michael Berry
Physics Department
University of Bristol, UK

Alexander Bobenko
Institute for Mathematics
Technical University Berlin, Germany

Boele Braaksma
Department of Mathematics and Computing Science
University of Groningen, Netherlands

David M. Bressoud
Mathematics and Computer Science Department
Macalester College, Minnesota

Bille C. Carlson
Mathematics Department and Ames Laboratory
Iowa State University

Peter A. Clarkson
Institute of Mathematics, Statistics & Actuarial Science
University of Kent, UK

Bernard Deconinck
Department of Applied Mathematics
University of Washington

Karl Dilcher
Department of Mathematics and Statistics
Dalhousie University, Canada

T. Mark Dunster
Department of Mathematics and Statistics
San Diego State University

Amparo Gil
Department of Mathematics
University of Madrid, Spain

Chris Howls
School of Mathematics
University of Southampton, UK

Alexander Its
Department of Mathematical Sciences
Indiana University - Purdue University at Indianapolis

Brian Judd
Department of Physics and Astronomy
Johns Hopkins University

Roelof Koekoek
Delft Institute of Applied Mathematics
Delft University of Technology, Netherlands

Tom H. Koornwinder
Korteweg-de Vries Institute for Mathematics
University of Amsterdam, Netherlands

Vadim Kuznetsov
Department of Applied Mathematics
University of Leeds, UK

Leonard C. Maximon
Department of Physics
George Washington University

Robb Muirhead
Pfizer Global R&D, New London, Connecticut

Edward Neuman
Department of Mathematics
Southern Illinois University at Carbondale

Adri B. Olde Daalhuis
School of Mathematics
University of Edinburgh, UK

Frank W. J. Olver
Institute for Physical Science and Technology and Department of Mathematics
University of Maryland, College Park

Richard B. Paris
Division of Mathematical Sciences
University of St. Andrews, UK

William P. Reinhardt
Department of Chemistry
University of Washington

Donald St. P. Richards
Department of Statistics
Pennsylvania State University

Ranjan Roy
Department of Mathematics and Computer Science
Beloit College, Wisconsin

Simon Ruijsenaars
Department of Applied Mathematics
University of Leeds, UK

Javier Segura
Department of Mathematics, Statistics, and Computation
University of Cantabria, Spain

Brian D. Sleeman
Department of Applied Mathematics
University of Leeds, UK

Rene F. Swarttouw
Faculty of Sciences
Vrije Universiteit Amsterdam, Netherlands

Nico M. Temme
Centrum voor Wiskunde en Informatica, Amsterdam, Netherlands

Ian J. Thompson
Lawrence Livermore National Laboratory

Hans Volkmer
Department of Mathematical Sciences
University of Wisconsin, Milwaukee

Peter L. Walker
American University of Sharjah, United Arab Emirates

Gerhard Wolf
Department of Mathematics
University of Duisberg-Essen, Germany

Roderick S. C. Wong
Liu Bei Ju Centre for Mathematical Sciences
City University of Hong Kong, China