# NIST releases successor to venerable handbook of math functions

May 12 2010

The National Institute of Standards and Technology has released the Digital Library of Mathematical Functions (DLMF) and its printed companion, the NIST Handbook of Mathematical Functions, the much-anticipated successors to the agency's most widely cited publication of all time. These reference works contain a comprehensive set of tools useful for specialists who work with mathematical modeling and computation.

The two works comprise a complete update and expansion of the 1964 Handbook of Mathematical Functions, which upon its publication quickly became an indispensable reference for scientists and engineers who use the tools of applied mathematics. NIST embarked on the new work in response to the Internet revolution in information exchange as well as advances in mathematics itself.

The new 36-chapter tome is designed to be the definitive reference work on "special functions," which are the most important and widely employed tools in applied mathematics. Special functions appear whenever natural phenomena are studied, engineering problems are formulated, and computer simulations are performed. They also crop up in statistics, financial models and economic analysis.

The new work differs from the 1964 publication in that it now includes information about additional special functions that have recently come to prominence in several scientific and technical fields. Perhaps the greatest difference, however, is its transformation into a Web-based

resource.

The DLMF, freely available on the Web, includes visual aids to provide qualitative information on the behavior of mathematical functions, including interactive tools for rotating and zooming in on three-dimensional representations. These visualizations can be explored with free browsers and plugins for PC, Mac and Linux systems. It also provides references to or hints for the proofs of all mathematical statements, offers advice on methods for computing mathematical functions, and provides active links to available software and references. With more than 8,000 equations and nearly 500 figures, the DLMF has about twice the amount of technical material of the 1964 publication.

"This is a much more complete package for the user," says NIST's Dan Lozier, one of the works' editors. "We anticipate the DLMF to be a useful resource for everyone who has benefited from the 1964 publication and expect that it will find new audiences among biologists, data security specialists and every other branch of science that employs computer-based models."

**More information:** The DLMF is available at dlmf.nist.gov/ . Its 967-page printed companion, the NIST Handbook of Mathematical Functions (ISBN 9780521192255) is published by Cambridge University Press.

Provided by National Institute of Standards and Technology