

NIST releases preview of much-anticipated online mathematics reference

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The National Institute of Standards and Technology (NIST) has released a five-chapter preview of the much-anticipated online Digital Library of Mathematical Functions (DLMF). In development for over a decade, the DLMF is designed to be a modern successor to the 1964 "Handbook of Mathematical Functions," a reference work that is the most widely distributed NIST publication (with over a million copies in print) and one of the most cited works in the mathematical literature (still receiving over 1,600 yearly citations in the research literature). The preview of the new DLMF is a fully functional beta-level release of five of the 36 chapters.

The DLMF is designed to be the definitive reference work on the special functions of applied mathematics. Special functions are "special" because they occur very frequently in mathematical modeling of physical phenomena, from atomic physics to optics and water waves. These functions have also found applications in many other areas; for example, cryptography and signal analysis. The DLMF provides basic information needed to use these functions in practice, such as their precise definitions, alternate ways to represent them mathematically, illustrations of how the functions behave with extreme values and relationships between functions.

The DLMF provides various visual aids to provide qualitative information on the behavior of mathematical functions, including interactive Web-based tools for rotating and zooming in on three-dimensional representations. These 3-D visualizations can be explored

with free browsers and plugins designed to work in virtual reality markup language (VRML). Mouse over any mathematical function, and the DLMF provides a description of what it is; click on it, and the DLMF goes to an entire page on the function. The DLMF adheres to a high standard for handbooks by providing references to or hints for the proofs of all mathematical statements. It also provides advice on methods for computing mathematical functions, as well as pointers to available software.

The complete DLMF, with 31 additional chapters providing information on mathematical functions from Airy to Zeta, is expected to be released in early 2009. With over 9,000 equations and more than 500 figures, it will have about twice the amount of technical material of the 1964 Handbook. An approximately 1,000-page print edition that covers all of the mathematical information available online also will be published. The DLMF, which is being compiled and extensively edited at NIST, received initial seed money from the National Science Foundation and resulted from contributions of more than 50 subject-area experts worldwide. The NIST editors for the DLMF are Frank W. J. Olver, Daniel W. Lozier, Ronald F. Boisvert and Charles W. Clark.

Source: National Institute of Standards and Technology (NIST)

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