DLMF Standard Reference Tables on Demand

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Abstract

In 2010, the National Institute of Standards and Technology (NIST) launched the NIST Digital Library of Mathematical Functions (DLMF) to update and replace the widely cited 1964 Abramowitz and Stegun resource, Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables (A&S). A&S addressed a critical need for accurate tables of reference values to support the computation and research of special functions, but today's reliable computing machines, computer algebra systems, and multiple precision computational packages have diminished the need for such tables. However, mathematical and physical scientists, numerical analysts, and software developers still need a way to test software for computing mathematical function values. DLMF Standard Reference Tables on Demand (DLMF Tables), http://dlmftables.uantwerpen.be/, is a collaborative project between members of the NIST Applied and Computational Mathematics Division (ACMD) and the University of Antwerp Computational Mathematics Research Group (CMA) to address this problem. We are developing an online system where users can generate tables of special function values at user-specified precision with an error certification to test their own algorithms or confirm the accuracy of results from a commercial or publicly available package. Ultimately, the goal is a standalone system that is also accessible from the NIST DLMF. We will discuss our beta site located at the University of Antwerp, which is based on CMA's MpIeee, a multiple precision IEEE 754/854 compliant C++ floating point arithmetic library.