Recent software developments for special functions in the Santander-Amsterdam project

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Abstract

We give a short overview of published algorithms by our group and of current activities and future plans. In particular we give details on algorithms for the incomplete gamma functions (by using power series, asymptotic expansions, and continued fractions). This work is partly based on an earlier algorithm developed by Gautschi (1979). In addition, new analytical and numerical algorithms for the inversion of the incomplete gamma functions are considered. This work forms the basis for our next project on Marcum's $Q-$function, or the non-central χ^2 cumulative distribution function. For this case we will use expansions in terms of incomplete gamma functions, asymptotic expansions, recurrence relations, and possibly numerical quadrature.

Key words: special functions; incomplete gamma functions, Marcum's $Q-$function, algorithms; power series; asymptotic expansions; recurrence relations; continued fractions; numerical quadrature.