ALGORITHM 654
FORTRAN Subroutines for Computing the Incomplete Gamma Function Ratios and their Inverse

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General Terms: Algorithms

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The FORTRAN subroutines GRATIO and GAMINV given here are the subroutines described in [1] for computing the incomplete gamma function ratios and their inverse. A sample program exercising GRATIO and GAMINV is given. The following functions are used.

ERF(x)	$= \text{erf } x$	
ERFC1(i,x)	$= \begin{cases} \text{erfc } x & \text{if } i = 0 \\ \exp(x^2)\text{erfc } x & \text{if } i \neq 0 \end{cases}$	
REXP(x)	$= \exp(x)-1$	
ALNREL(a)	$= \ln(1 + a)$	$a > -1$
RLOG(x)	$= x - 1 - \ln x$	$x > 0$
RCOMP(a, x)	$= e^{-x} x^a/\Gamma(a)$	$a > 0$, $x \geq 0$
GAMMA(a)	$= \Gamma(a)$	$a \neq 0, -1, -2, \ldots$
GAM1(x)	$= 1/\Gamma(1 + a) - 1$	$-.5 \leq x \leq 1.5$
GAMLN(A)	$= \ln \Gamma(a)$	$a > 0$
GAMLN1(x)	$= \ln \Gamma(1 + x)$	$-.2 \leq x \leq 1.25$

These functions, written by A. H. Morris, are part of the NSWC mathematics subroutine library [3].

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Machine-Dependent Constants

The function SPMPAR provides the machine-dependent constants needed by GRATIO and GAMINV. It is necessary that SPMPAR be properly defined for the computer arithmetic being used. The constants are defined in the in-line documentation of SPMPAR. Values for these constants are given for many computers in the in-line documentation. SPMPAR, released by Argonne National Laboratory, is an adaptation of the Bell Laboratories function R1MACH [2].

Transportability

All coding adheres to the 1966 and 1977 ANSI FORTRAN standards. It is assumed that a floating point arithmetic of 6 or more digits is being used. The codes were designed specifically for k-digit arithmetics where $k \leq 14$. If $k > 14$, then only 14-digit accuracy will normally be obtained.

REFERENCES

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