Subject: Re: Complex arguments in Bessel functions
Posted by Matt Feinstein on Mon, 01 Nov 2004 12:46:33 GMT
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On Mon, 01 Nov 2004 11:45:41 +0000, Ben Carter <app03bc@shef.ac.uk>
wrote:

> I am attempting to solve an equation in IDL which involves Modified
> Bessel Functions (using a simple root finding algorithm(newtons
> method)). The roots to the equation however are complex and IDL's
> 'beselK(argument, order)' function ignores imaginary numbers when
> entered so for example gives: beselK(1,0) = beselK(1+i,0) and
> beselk(i,0) gives an error since K(x,0) -> inf. as x ->inf.
> Q: Does anyone know if there is an easy way round this....or, in fact,
> any way round it at all?
> Thanks,
> Ben Carter

I don't know about 'easy'... but according to Eq. 9.6.4 in Abramowitz
and Stegun, values of modified Bessel functions for complex argument
can be computed from values of Hankel functions for complex argument
(Hankel functions are basically J(z) +/- i Y(z)), and the zeroes of
Hankel functions are discussed on page 373. More general equations for
values of J(x+iy) and Y(x+iy) can be derived from the Bessel function
addition theorem, Eq. 9.1.75.

Matt Feinstein

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There is no virtue in believing something that can be proved to be true.