A CORRECTION TO A HIGHLY ACCURATE VOIGT FUNCTION ALGORITHM

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An algorithm for rapidly computing the complex Voigt function was published by Shippony and Read [1]. Its claimed accuracy was 1 part in 10^8. It was brought to our attention by Wells [2] that Shippony and Read [1] was not meeting its claimed accuracy for extremely small but non zero y values. Although true, the fix to the code is so trivial to warrant this note for those who use this algorithm. In the code, there exist in two subroutines, `VoigtR1` and `VoigtR3` a threshold variable called `tiny = 1.0d-12`. Any value of $10^{-12} > y > 0$ may have have errors exceeding the target accuracy. The parameterization for `tiny` should have been the minimum precision of the computer (it is machine dependent, for the SGI origin it is `tiny = 2.2d-16`). Fortunately, FORTRAN 90 has a function, `epsilon(y)` that returns the smallest allowable value therefore setting `tiny = epsilon(y)` will ensure the algorithm's accuracy on any platform. We thank R. J. Wells for bringing this error to our attention.

References

[1] Z. Shippony and W. G. Read. A highly accurate Voigt function algorithm. *J. Quant. Spectrosc. Radiat. Transfer*, 50:635–646, 1993.

[2] R. J. Wells. Rapid approximation to the Voigt/Faddeeva function and its derivatives. *J. Quant. Spectrosc. Radiat. Transfer*, 62(1):29–48, 1999.