A new algorithm for computation of a speed dependent lineshape function is presented. The lineshape that is calculated is based upon a quadratic model for the Lorentz width as a function of velocity. The calculation includes both real and imaginary parts of the lineshape for applications to line mixing and Dicke narrowing. This algorithm sacrifices a small amount of memory space for a considerable gain in speed and accuracy and employs methods similar to the techniques used to calculate the Voigt profile as described by Letchworth and Benner. For Lorentz widths greater than about five times the Doppler width and for points more than about five Doppler widths from the center of the spectral line, Gauss-Hermite quadrature is employed. For most other cases, a Taylor series expansion about the nearest point in a precomputed table is used. In some cases where the Doppler width is more than an order of magnitude larger than the Lorentz width, Lagrange interpolating polynomials are used with a table of precomputed points. The accuracy is one part in $10^9$ of the value of the function itself. Optionally, derivatives with respect to certain lineshape parameters are also returned. The algorithm provides a good approximation for speed dependent lineshapes with a calculation time which is not significantly larger than the time required to calculate the Voigt profile using the Drayson, Humlicek, and Letchworth and Benner routines.

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