1046-41-1474 **Patricia Mellodge*** (mellodge@hartford.edu), 200 Bloomfield Avenue, CETA, West Hartford, CT 06117, and **S. S. Townsend**. *Approximating Bessel Functions of the First Kind Using Super-Gaussians.*

This work addresses the approximation of the Bessel function $J_m(x)$ of integer order and real argument using the exponentials $e^{-a_n x^n}$. This generalized form of the Gaussian function is known as a super-Gaussian in the optics community. The objective is to approximate the Bessel function using a configuration that converges more rapidly and is more computationally efficient than the well known series expansion for small arguments. For $x < m$, the approximation takes the form $x^m e^{-H_m(x)}$, where $H_m(x)$ is an infinite series containing nonnegative even powers of x. The coefficients of powers of x are given by a recursive relationship where the first coefficient is an overall scaling factor and the second coefficient corresponds to the optimal value for Gaussian approximation. This recursion can be expressed as a finite convolution sum. Truncating $H_m(x)$ to a finite series introduces an error in the approximation that becomes larger as x approaches m. Analysis is given and numerical results are provided that indicate the relationship between the number of terms in $H_m(x)$ used and error introduced. (Received September 15, 2008)