“Truncated” Gaussian quadrature rules for exponential weights

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In 1987 P. Barrucand described to G. Mastroianni and G. Monegato some numerical experiments showing that the following “truncated” Gaussian rule

$$\int_0^\infty f(x)\,\mathrm{e}^{-x}\,\mathrm{d}x = \sum_{i=1}^{n} \lambda_{m,i} f(x_{m,i}) + R_{m,n}(f)\,, \qquad m > n\,,$$

where $x_{m,i}$ are the zeros of the mth Laguerre polynomial and $\lambda_{m,i}$ are the associated Christoffel numbers, provides better approximations than those obtained using the ordinary Gauss–Laguerre formula. Subsequently, G. Mastroianni and G. Monegato studied the convergence of the “truncated” Gauss–Laguerre rule and the related Nyström method for Fredholm integral equations [3, 4].
In the past twenty years this procedure has been extended in several directions and the underlying theory has been deepened (see [2, 1] and the references therein).
In this talk we will discuss new results and numerical advantages of “truncated” quadrature rules related to different exponential weights on bounded or unbounded intervals of the real line.

References

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