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An error expansion for Gauss-Turán quadrature with Chebyshev weight function

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Abstract

Our aim in this paper is to obtain an expansion for the error in the Gauss-Turán quadrature formula for approximating $\int_{-1}^{1} f(t)w(t)\,dt$ in the case when f is an analytic function in some region of the complex plane containing the interval $[-1,1]$ in its interior, and the remainder term is presented in the form of contour integral over confocal ellipses (cf. [1]). Using some ideas from [2] we get a few new estimates of the remainder term. In particular, for some Chebyshev weights we obtain very exact estimations of the error term. Some numerical results, illustrations and comparisons with results from [3] are shown.

Key words: Gauss-Turán quadrature; s-orthogonal polynomial; Zeros; Multiple nodes; Weight; Remainder term for analytic functions; Contour integral representation; Error expansion; Error estimate

AMS classification: Primary 41A55; Secondary 65D30, 65D32

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