An optimal set of quadrature rules for trigonometric polynomials

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In this paper we consider an optimal set of quadrature rules with an odd number of nodes for trigonometric polynomials in the sense of Borges [Numer. Math. **67** (1994), 271–288]. As a matter of fact we consider evaluation of a set of $p \in \mathbb{N}$ definite integrals related to a common integrand over the same interval E of length 2π, but taken with respect to the different weight functions. The optimal set of quadrature rules is characterized by multiple orthogonal trigonometric polynomials of semi–integer degree. We give main properties of such multiple orthogonal trigonometric system as well as the numerical procedure for constructing the corresponding quadrature rules. Theoretical results are illustrated by some numerical examples.