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Editors:

Dr. Davorka Jandrlić, Associate Professor
Faculty of Mechanical Engineering, University of Belgrade
Dr. Jelena Tomanović, Associate Professor
Faculty of Mechanical Engineering, University of Belgrade

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Recurrence Relations for Multiple Orthogonal Trigonometric Polynomials of Semi-Integer Degree and its Applications

Aleksandar Ne. Jovanović¹, Marija P. Stanić², Tatjana V. Tomović
Mladenović², and Nevena Z. Petrović¹

¹ University of Kragujevac, Faculty of Mechanical and Civil Engineering in Kraljevo,
Dositejeva 19, 36000 Kraljevo, Serbia

`jovanovic.a@fmkv.rs`, `nevena.z.petrovic@pmf.kg.ac.rs`

² University of Kragujevac, Faculty of Science, Radoja Domanovića 12, 34000
Kragujevac, Serbia.

`{marija.stanic,tatjana.tomovic}@pmf.kg.ac.rs`

Abstract

In this paper, we show that the construction of multiple orthogonal trigonometric polynomials of semi-integer degree can be based solely on recurrence relations involving nearest-neighbor multi-indices. These polynomials are important for constructing optimal sets of quadrature rules with an odd number of nodes for trigonometric polynomials, in the sense of Borges [Numer. Math. 67 (1994) 271–288]. Also, we introduce the set of anti-Gaussian quadrature rules for the optimal set of quadrature rules with an odd number of nodes for trigonometric polynomials, in the sense of Borges. We construct such quadrature rules using multiple orthogonal trigonometric polynomials of semi-integer degree, and present some illustrative numerical examples.

Keywords: Trigonometric Polynomials of Semi-Integer Degree, Multiple orthogonality, Weight function, Optimal sets of quadrature rules in the sense of Borges