

Summation and Quadrature Processes for Slowly Convergent Series

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Abstract: An account on summation/integration methods for computation of slowly convergent series and finite sums, as well as some new results on this subject and new applications, are presented. Methods are based on Gaussian quadrature formulas with respect to some non-classical weight functions over the real line or the halfline. For constructing such quadrature rules we use recent progress in symbolic computation and variable-precision arithmetic, implemented through our **Mathematica** package “*OrthogonalPolynomials*” [1], [2]. Some details on these methods can be found in [3], [4], [5].

Keywords: Summation, Gaussian quadrature rules, weight function, convergence, orthogonal polynomials.

References:

- [1] A. S. Cvetković and G. V. Milovanović, “The Mathematica Package *OrthogonalPolynomials*”, *Facta Univ. Ser. Math. Inform.* **19** (2004), 17-36.
- [2] G. V. Milovanović and A. S. Cvetković, “Special classes of orthogonal polynomials and corresponding quadratures of Gaussian type”, *Math. Balkanica* **26** (2012), 169-184.
- [3] G. V. Milovanović, “Summation of series and Gaussian quadratures”, In: *Approximation and Computation* (R.V.M. Zahar, ed.), ISNM Vol. 119, pp. 459-475, Birkhäuser Verlag, Basel-Boston-Berlin, 1994.
- [4] G. Mastroianni and G. V. Milovanović, *Interpolation Processes - Basic Theory and Applications*, Springer Monographs in Mathematics, Springer Verlag, Berlin - Heidelberg - New York, 2008.
- [5] G. V. Milovanović, “Summation formulas of Euler-Maclaurin and Abel-Plana: old and new results and applications”, In: *Progress in Approximation Theory and Applicable Complex Analysis – In the Memory of Q.I. Rahman* (N.K. Govil, R.N. Mohapatra, M.A. Qazi, G. Schmeisser, eds.), Springer, 2017 (to appear).