

THE OSTROWSKI TYPE INEQUALITIES WITH THE APPLICATION TO THE THREE POINT INTEGRAL FORMULA

SANJA KOVAČ, JOSIP PEČARIĆ AND SANJA TIPURIĆ-SPUŽEVIĆ

Abstract. The generalization of the integral formula with three nodes is introduced, and some sharp and the best possible inequalities for the functions whose higher order derivatives belong to L_p spaces are given. We establish non-weighted version of the three point integral formula. From the general non-weighted formula we shall get the famous Simpson, dual Simpson and Maclaurin formulae. Some new errors of approximation in these integral formulae are obtained.

Mathematics subject classification (2010): 26D15, 65D30, 65D32.

Keywords and phrases: sequences of harmonic polynomials, numerical integration, L_p spaces, inequalities, Gaussian quadrature, Simpson's rule, dual Simpson's rule, Maclaurin's rule.

REFERENCES

- [1] L.J. DEDIĆ, M. MATIĆ, J. PEČARIĆ, *On dual Euler-Simpson formulae*, Bull. Belg. Math. Soc. **18** (2001), 479–504.
- [2] L.J. DEDIĆ, M. MATIĆ, J. PEČARIĆ, *Euler-Maclaurin formulae*, Mathematical Inequalities and Applications **6**, 2 2003, 247–275.
- [3] P. J. DAVIS, P. RABINOWITZ, *Methods of numerical integration*, Academic Press, New York-San Francisco-London, 1975.
- [4] A. GUESSAB, G. SCHMEISSER, *Sharp integral inequalities of the Hermite-Hadamard type*, Journal of Approximation Theory **115**, 2 (2002), 260–288.
- [5] S. KOVAČ, J. PEČARIĆ, S. TIPURIĆ-SPUŽEVIĆ, *Weighted Ostrowski Type Inequalities with Application to One-point Integral Formula*, Mediterranean Journal of Mathematics **11** (2014), 13–30.
- [6] S. KOVAČ, J. PEČARIĆ, *Weighted version of general integral formula*, Mathematical Inequalities & Applications, **13**, 3 (2010), 579–599.
- [7] S. KOVAČ, J. PEČARIĆ, *Generalization of an Integral Formula of Guessab and Schmeisser*, Banach Journal of Mathematical Analysis **5**, 1 (2011), 1–18.
- [8] S. KOVAČ, J. PEČARIĆ, *Weighted version of general integral formula of the Euler type*, to appear in Math. Inequal. Appl.
- [9] S. KOVAČ, J. PEČARIĆ, A. VUKELIĆ, *A generalization of general two-point formula with applications in numerical integration*, Nonlinear Analysis: Theory, Methods & Applications **68** (2008), 2445–2463.
- [10] Z. LIU, *An inequality of Simpson type*, Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences **461** (2005), 2155–2158.
- [11] D. S. MITRINOVIĆ, J. E. PEČARIĆ, AND A. M. FINK, *Classical and New Inequalities in Analysis*, Kluwer Academic Publishers, Dordrecht, 1993.
- [12] M. NIEZGODA, *Griiss and Ostrowski Type Inequalities*, Applied Mathematics and Computation **217** 23 (2011), 9779–9789.
- [13] J. PEČARIĆ, S. VAROŠANEC, *Harmonic Polynomials and Generalization of Ostrowski Inequality with Applications in Numerical Integration*, Nonlinear Analysis: Theory, Methods & Applications **47** (2001), 2365–2374.