

## GENERALIZATION OF TWO-POINT OSTROWSKI'S INEQUALITY

MOHAMMAD W. ALOMARI, NAZIA IRSHAD,  
ASIF R. KHAN AND MUHAMMAD AWAIIS SHAIKH

**Abstract.** The paper presents a novel approach to generalize the two-point weighted Ostrowski's formula for Riemann-Stieltjes integrals by utilizing a unique class of functions of bounded  $r$ -variation. The proposed approach yields several results that exhibit sharp and better bounds compared to existing established results by using parameters and weights. Additionally, the paper also captures many of the known results as special cases.

**Mathematics subject classification (2020):** 26D15, 26D20, 26D99.

**Keywords and phrases:** Ostrowski's inequality, bounded  $p$ -variation, Lipschitz continuous functions.

### REFERENCES

- [1] M. W. ALOMARI, *Two-point Ostrowski's inequality*, Results in Math., **72** (2017), 1499–1523.
- [2] M. W. ALOMARI, *A sharp companion of Ostrowski's inequality for the Riemann Stieltjes integral and applications*, Ann. Univ. Paedagog. Crac. Stud. Math., **15** (2016), 69–78.
- [3] M. W. ALOMARI, *A companion of Ostrowski's inequality for the Riemann-Stieltjes integral, where  $f$  is of bounded variation and  $u$  is of  $r$ -Hölder type and applications*, Appl. Math. Comput., **219** (2013), 4792–4799.
- [4] M. W. ALOMARI, *New sharp inequalities of Ostrowski and generalized trapezoid type for the Riemann-Stieltjes integrals and applications*, Ukrainian Math. J., **65** (7) (2013), 995–1018.
- [5] M. W. ALOMARI, *A companion of the generalized trapezoid inequality and applications*, J. Math. Appl., **36** (2013), 5–15.
- [6] M. W. ALOMARI, *A companion of Dragomir's generalization of Ostrowski's inequality and applications to numerical integration*, Ukrainian Math. J., **64** (4) (2012), 491–510.
- [7] P. CERONE, S. S. DRAGOMIR, C. E. M. PEARCE, *A generalized trapezoid inequality for functions of bounded variation*, Turk. J. Math., **24** (2000), 147–163.
- [8] S. S. DRAGOMIR, *A companion of J. Ostrowski's inequality for functions of bounded variation and applications*, Int. J. Nonlinear Anal. Appl., **5** (2014), no. 1, 89–97.
- [9] S. S. DRAGOMIR, *Some companions of Ostrowski's inequality for absolutely continuous functions and applications*, Bull. Korean Math. Soc., **42** (2) (2005), 213–230.
- [10] S. S. DRAGOMIR, *The Ostrowski integral inequality for mappings of bounded variation*, Bull. Austral. Math. Soc., **60** (3) (1999), 495–508.
- [11] R. M. DUDLEY, *Frechet differentiability,  $p$ -variation and uniform Donsker classes*, Ann. Probab., **20** (4) (1992), 1968–1982.
- [12] B. I. GOLUBOV, *On criteria for the continuity of functions of bounded  $p$ -variation*, Sibirskii Mat. Zhurnal, **13** (5) (1972), 693–702.
- [13] B. I. GOLUBOV, *On functions of bounded  $p$ -variation*, Math. USSR Izvest., **2** (4) (1968), 799–819.
- [14] A. GUSSAB, G. SCHMEISSER, *Sharp integral inequalities of the Hermite-Hadamard type*, J. approx. Theory, **15** (2) (2002), 260–288.
- [15] SERGEI IVANOVICH HUDJAEV, AIZIK ISAAKOVICH VOL'PERT, *Analysis in classes of discontinuous functions and equations of mathematical physics*, Mechanics: analysis, 8, Dordrecht-Boston-Lancaster: Martinus Nijhoff Publishers (1985).
- [16] S. KOVAC, J. PEČARIĆ, A. VUKELIĆ, *A generalization of general two-point formula with applications in numerical integration*, Nonlinear Anal.: Theory, Methods and Appl., **68** (8) (2008), 2445–2463.

- [17] D. LESNIC, *Characterization of the functions with bounded variation*, Proceedings of the International Conference on Theory and Applications of Mathematics and Informatics – ICTAMI 2003, Alba Iulia.
- [18] D. S. MITRINOVIĆ, J. E. PEČARIĆ, A. M. FINK, *Calassical and new inequalities in analysis*, in: Mathematics and its application (East European Series), vol. 61, Kluwer, Dordrecht (1993).
- [19] A. M. OSTROWSKI, *Über die absolutabweichung einer differentierbaren funktion von ihren integralmittelwert*, Comment. Math. Helv., **10** (1937), 226–227.
- [20] J. PEČARIĆ, I. PERIĆ, A. VUKELIĆ, *Sharp integral inequalities based on general Euler two-point formulae*, ANZIAM J. **46** (2005), 555–574.
- [21] N. WIENER, *The quadratic variation of a function and its Fourier coefficients*, Mass. J. Math., **3** (1924), 72–94.
- [22] F. ZAFAR, *Some Generalizations of Ostrowski Inequalities and their Applications to Numerical Integration and Special Means*, Unpublished doctoral dissertation, Bahauddin Zakariya University, Multan, Pakistan, 2009.