Fractional
Differential
Calculus
Volume 11, Number 2 (2021), 219–239
doi:10.7153/fdc-2021-11-15

GENERALIZED FRACTIONAL OSTROWSKI TYPE INEQUALITIES VIA $\phi - \lambda$–CONVEX FUNCTION

ALI HASSAN* AND ASIF RAZA KHAN

Abstract. In this paper, we would like to state well-known Ostrowski inequality via generalized Montgomery identity for the $\phi - \lambda$-convex function. Also, we would like to state the generalization of the classical Ostrowski inequality via generalized fractional integrals, which is obtained for functions whose first derivative in absolute values is $\phi - \lambda$-convex. Moreover we establish some Ostrowski type inequalities via generalized fractional integrals and their particular cases for the class of functions whose derivatives in absolute values at certain powers are $\phi - \lambda$-convex by using different techniques including Hölder's inequality and power mean inequality. Also, standard results would be capture as special cases. Moreover, some applications in terms of special means would also be given.

Mathematics subject classification (2020): 26A33, 26A51, 26D15, 26D99, 47A30, 33B10.
Keywords and phrases: Ostrowski inequality, convex, power mean inequality, Hölder's inequality.

REFERENCES

[1] M. ALOMARI, M. DARUS, S. S. DRAGOMIR AND P. CERONE, *Ostrowski type inequalities for functions whose derivatives are s-convex in the second sense*, Appl. Math. Lett., **23**, (2010), 1071–1076.
[2] E. F. BECKENBACH, *Convex*, Bull. Amer. Math. Soc., **54**, (1948), 439–460.
[3] W. W. BRECKNER, *Stetigkeitsaussagen Fur Eine Klasse Verallgemeinerter Konvexer Funktionen in Topologischen Linearen Raumen* (German), Publ. Inst. Math., **23** 37, (1978), 13–20.
[4] E. SET, *New inequalities of Ostrowski type for mappings whose derivatives are s-convex in the second sense via fractional integrals*, Comput. Math. Appl., **63** (2012), 1147–1154.
[5] M. J. V. CORTEZ, J. E. HERNÁNDEZ, *Ostrowski and Jensen-type inequalities via* (s,m)*-convex in the second sense*, Bol. Soc. Mat. Mex., **26**, (2020), 287–302.
[6] S. S. DRAGOMIR, *A Companion of Ostrowski's Inequality for Functions of Bounded Variation and Applications*, Int. J. Nonlinear Anal. Appl., **5** (2014), 89–97.
[7] S. S. DRAGOMIR, *The Generalization of Ostrowski Inequality via Montgomery identity*, Acta Math. Univ. Comenianae, LXXXIV, **1**, (2015), 63–78.
[8] S. S. DRAGOMIR, *On the Ostrowski's Integral Inequality for Mappings with Bounded Variation and Applications*, Math. Inequal. Appl., **4** (1), (2001), 59–66.
[9] S. S. DRAGOMIR, *Integral inequalities of Jensen type for* λ*-convex*, In Proceedings of RGMIA, Res. Rep. Coll., **1** (17), (2014).
[10] S. S. DRAGOMIR, *Inequalities of Jensen Type for* ϕ*-convex*, Fasciculi Mathematici, **5**, (2015), 35–52.
[11] S. S. DRAGOMIR, *Refinements of the Generalised Trapozoid and Ostrowski Inequalities for Functions of Bounded Variation*, Arch. Math., **91** (5), (2008), 450–460.
[12] S. S. DRAGOMIR AND N. S. BARNETT, *An Ostrowski Type Inequality for Mappings whose Second Derivatives are Bounded and Applications*, J. Indian Math. Soc. (N.S.), **66** (4) (1999), 237–245.
[13] S. S. DRAGOMIR, P. CERONE, N. S. BARNETT AND J. ROUMELIOTIS, *An Inequality of the Ostrowski Type for Double Integrals and Applications for Cubature Formulae*, Tamsui Oxf. J. Math. Sci., **16** (1), (2000), 1–16.
[14] S. S. DRAGOMIR, P. CERONE AND J. ROUMELIOTIS, *A new Generalization of Ostrowski Integral Inequality for Mappings whose Derivatives are Bounded and Applications in Numerical Integration and for Special Means*, Appl. Math. Lett., **13** (2000), 19–25.

Paper FDC-11-15

[15] S. S. DRAGOMIR, J. PEČARIĆ AND L. PERSSON, *Some inequalities of Hadamard type*, Soochow J. Math., **21** (3), (1995), 335–341.
[16] A. EKINCI, *Klasik Eşitsizlikler Yoluyla Konveks Fonksiyonlar için Integral Eşitsizlikler*, Ph. D. Thesis, Thesis ID: 361162 in tez2.yok.gov.tr Atatürk University, 2014.
[17] E. K. GODUNOVA, V. I. LEVIN, *Inequalities for functions of a broad class that contains convex, monotone and some other forms of functions*, Numerical Mathematics and Mathematical Physics, (Russian), **166**, (1985), 138–142.
[18] M. MATŁOKA, *On Ostrowski type inequalities via fractional integrals of The with respect to another function*, Journal pf Nonlinear Science and Applications, **13**, (2020), 100–106
[19] M. A. NOOR AND M. U. AWAN, *Some integral inequalities for two kinds of convexities via fractional integrals*, TJMM, **5**, (2013), 129–136.
[20] A. M. OSTROWSKI, *Uber die absolutabweichung einer differentiebaren funktion von ihrem integralmitelwert*, Comment. Math. Helv., **10**, (1938), 226–227.
[21] S. G. SAMKO, A. A. KILBAS, O. I. MARICHEV, *Fractional Integrals and Derivatives*, Theory and Applications Gordon and Breach New York, **1**, (1993).
[22] E. SET, *New inequalities of Ostrowski type for mappings whose derivatives are s-convex in the second sense via fractional integrals*, Comput. Math. Appl., **63**, (2012), 1147–1154.
[23] S. VAROŠANEC, *On h-convexity*, J. Math. Anal. Appl., **326** (1), (2007), 303–311.
[24] Z. G. XIAO, AND A. H. ZHANG, *Mixed power mean inequalities*, Research Communication on Inequalities, **8** (1), (2002), 15–17.
[25] X. YANG, *A note on Hölder inequality*, Appl. Math. Comput., **134**, (2003), 319–322.