GENERALIZED HERMITE–HADAMARD TYPE INEQUALITIES
FOR DIFFERENTIABLE HARMONICALLY–CONVEX
AND HARMONICALLY QUASI–CONVEX FUNCTIONS

Muhammad Amer Latif, Sabir Hussain and Yu-Ming Chu*

Abstract. Some new Hermite-Hadamard type inequalities for differentiable harmonically-convex and harmonically quasi-convex functions have been discussed, generalizing some existing results in literature. For validity of the results some numerically examples are given.

Mathematics subject classification (2020): 26D15, 26D20, 26D07.
Keywords and phrases: Hermite-Hadamard's inequality, harmonically-convex function, harmonically quasi-convex function, Hölder's integral inequality.

REFERENCES

[1] F. X. Chen and S. H. Wu, *Some Hermite-Hadamard type inequalities for harmonically s-convex functions*, The Scientific World Journal, (2014), Article ID 279158.

[2] F. Chen and S. Wu, *Fejér and Hermite-Hadamard type inequalities for harmonically convex functions*, J. Appl. Math., (2014), Article ID 386806, 6.

[3] J. Hadamard, *Étude sur les Propriétés des Fonctions Entières en Particulier d'une Fonction Considérée par Riemann*, Journal de Mathématique Pures et Appliquées, **58** (1893), 171–215.

[4] Y.-X. Li, M. A. Ali, H. Budak, M. Abbas and Y.-M. Chu, *A new generalization of some quantum integral inequalities for quantum differentiable convex functions*, Adv. Difference Equ., **2021** (2021), Article 225, 15 pages.

[5] Y.-X. Li, M. H. Alshbool, Y.-P. Lv, I. Khan, M. Riza Khan and A. Issakhov, *Heat and mass transfer in MHD Williamson nanofluid flow over an exponentially porous stretching surface*, Case Stud. Therm. Eng., **26** (2021), Article ID 100975, 10 pages.

[6] Y.-X. Li, T. Muhammad, M. Bilal, M. Altaf Khan, A. Ahmadian and B. A. Pansera, *Fractional simulation for Darcy-Forchheimer hybrid nanoliquid flow with partial slip over a spinning disk*, Alex. Eng. J., **60** (2021), 4787–4796.

[7] Y.-X. Li, A. Rauf, M. Naeem, M. A. Binyamin and A. Aslam, *Valency-based topological properties of linear hexagonal chain and hammer-like benzenoid*, Complexity, **2021** (2021), Article ID 9939469, 16 pages.

[8] Y.-X. Li, F. Shah, M. Ijaz Khan, R. Chinram, Y. Elmasry and T.-C. Sun, *Dynamics of Cattaneo-Christov double diffusion (CCDD) and arrhenius activation law on mixed convective flow towards a stretched Riga device*, Chaos Solitons Fractals, **148** (2021), Article ID 111010, 5 pages.

[9] İ. İscan, *Hermite-Hadamard type inequalities for harmonically convex functions*, Hacettepe Journal of Mathematics and Statistics **43** (6) (2014), 935–942.

[10] M. A. Latif, S. S. Dragomir and E. Momoniat, *Fejér type inequalities for harmonically-convex functions with applications*, Journal of Applied Analysis and Computation, **7** (3) (2017), 795–813.

[11] M. A. Latif, S. S. Dragomir and E. Momoniat, *Some Fejér type inequalities for harmonically-convex functions with applications to special means*, International Journal of Analysis and Applications, **13** (1) (2017), 1–14.

[12] M. A. Noor, K. I. Noor, M. U. Awana and S. Costache, *Some integral inequalities for harmonically h-convex functions*, U.P.B Sci. Bull. Serai A., **77** (1) (2015), 5–16.

[13] M. A. NOOR, K. I. NOOR, S. IFTIKHAR, *Hermite-Hadamard inequalities for strongly harmonic convex functions*, J. Inequal. Spec. Funct., **7** (2016), 99–113.

[14] J. PARK, *Hermite-Hadamard type inequalities for harmonically quasi-convex functions (II)*, International Journal of Mathematical Analysis, 8 (33) (2014), 1605–1614.

[15] W. WANG, İ. İSCAN, H. ZHOU, *Fractional integral inequalities of Hermite-Hadamard type for m-HH convex functions with applications*, Advanced Studies in Contemporary Mathematics (Kyungshang), **26** (3) (2016), 501–512.

[16] W. WANG AND J. QI, *Some new estimates of Hermite-Hadamard inequalities for harmonically convex functions with applications*, International Journal of Analysis and Applications **13** (1) (2017), 15–21.

[17] T.-Y. ZHANG AND FENG QI, *Integral inequalities of Hermite-Hadamard type for m-AH convex functions*, Turkish Journal of Analysis and Number Theory, **3** (2) (2014), 60–64.

[18] T.-Y. ZHANG, A.-P. JI, AND F. QI, *Integral inequalities of Hermite-Hadamard type for harmonically quasi-convex functions*, Proceedings of the Jangjeon Mathematical Society, Memoirs of the Jangjeon Mathematical Society, **16** (3) (2013), 399–407.

[19] J. E. PECARIC, F. PROSCHAN, Y. L. TONG, *Convex functions, partial orderings and statistical applications*, Academic, Academic Press, Boston, 1992.

Journal of Mathematical Inequalities
www.ele-math.com
jmi@ele-math.com