

On strongly convex functions

JUDIT MAKÓ and ATTILA HÁZY

ABSTRACT.

The main results of this paper give a connection between strong Jensen convexity and strong convexity type inequalities. We are also looking for the optimal Takagi type function of strong convexity. Finally a connection will be proved between the Jensen error term and an useful error function.

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REFERENCES

- [1] Azócar, A., Giménez, J., Nikodem, K. and Sánchez, J. L., *On strongly midconvex functions*, Opuscula Math., **31** (2011), No. 1, 15–26
- [2] Bernstein, F. and Doetsch, G., *Zur Theorie der konvexen Funktionen*, Math. Ann., **76** (1915), No. 4, 514–526
- [3] Boros, Z., *An inequality for the Takagi function*, Math. Inequal. Appl., **11** (2008), No. 4, 757–765
- [4] González, C., Nikodem, K., Páles, Zs., and Roa, G., *Bernstein-Doetsch type theorems for set-valued maps of strongly and approximately convex and concave type*, Publ. Math. Debrecen, **84** (2014), 229–252
- [5] Hadamard, J., *Étude sur les propriétés des fonctions entières et en particulier d'une fonction considérée par Riemann*, J. Math. Pures Appl., **58** (1893), 171–215
- [6] Házy, A. and Páles, Zs., *On approximately t -convex functions*, Publ. Math. Debrecen, **66** (2005), 489–501
- [7] Makó, J. and Nikodem, K. and Páles, Zs., *On strong (α, \mathbb{F}) -convexity*, Math. Inequal. Appl., **15** (2012), 289–299
- [8] Makó, J. and Páles, Zs., *Approximate convexity of Takagi type functions*, J. Math. Anal. Appl., **369** (2010), 545–554
- [9] Makó, J. and Páles, Zs., *On φ -convexity*, Publ. Math. Debrecen, **80** (2012), 107–126
- [10] Makó, J. and Páles, Zs., *Approximate Hermite–Hadamard type inequalities for approximately convex functions*, Math. Inequal. Appl., **16** (2013), 507–526
- [11] Makó, J. and Páles, Zs., *On approximately convex Takagi type functions*, Proc. Amer. Math. Soc., **141** (2013), 2069–2080
- [12] Merentes, N. and Nikodem, K., *Remarks on strongly convex functions*, Aequat. Math., **80** (2010), 193–199
- [13] Ng, C. T. and Nikodem, K., *On approximately convex functions*, Proc. Amer. Math. Soc., **118** (1993), No. 1, 103–108
- [14] Nikodem, K. and Páles, Zs., *Characterizations of inner product spaces by strongly convex functions*, Banach J. Math. Anal., **5** (2011), No. 1, 83–87
- [15] Páles, Zs., *The Forty-first International Symposium on Functional Equations*, June 8–15, 2003, Noszvaj, Hungary, Aequat. Math., **67** (2004), 285–320
- [16] Polyak, B. T., *Existence theorems and convergence of minimizing sequences in extremum problems with restrictions*, Soviet Math. Dokl., **7** (1966), 72–75
- [17] Tabor, Ja. and Tabor, Jó., *Generalized approximate midconvexity*, Control Cybernet., **38** (2009), No. 3, 655–669

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Corresponding author: Judit Makó; matjudit@uni-miskolc.hu

- [18] Tabor, Ja. and Tabor, Jó., *Takagi functions and approximate midconvexity*, J. Math. Anal. Appl., **356** (2009), No. 2, 729–737
- [19] Takagi, T., *A simple example of the continuous function without derivative*, J. Phys. Math. Soc. Japan, **1** (1903), 176–177

UNIVERSITY OF MISKOLC
INSTITUTE OF MATHEMATICS
H-3515 MISKOLC-EGYETEMVÁROS, HUNGARY
E-mail address: {matjudit, matha}@uni-miskolc.hu