

HYERS-ULAM-RASSIAS STABILITY OF A SEXTIC FUNCTIONAL EQUATION

NEHJAMANG HAOKIP

ABSTRACT. A new sextic functional equation is considered and its general solution is obtained. The Hyers-Ulam-Rassias stability of the sextic functional equation is also discussed using the direct method of D.H. Hyers as well as the fixed point method.

REFERENCES

- [1] T. Aoki: *On the Stability of the linear Transformation in Banach Spaces*, J. Math. Soc. Japan, **2**(1950), No. 1-2, 64-66.
- [2] J.A. Baker: *A general functional equation and its stability*, Proc. Amer. Math. Soc., **133**(2005), 1657-1664.
- [3] A. Bodaghi: *Stability of a quartic functional equation*, Sci. World J., **2014**(2014), Article ID 752146, 9 pages.
- [4] L. Cădariu and V. Radu: *Fixed point method for the generalized stability of functional equations in a single variable*, Fixed Point Theory Appl., **2008**(2007), Article ID 749392, 15 pages.
- [5] I. Cho, D. Kang and H. Koh: *Stability problems of quintic mappings in quasi- β -normed Spaces*, J. Inequal. Appl., **2010**(2010), Article ID 368981, 9 pages.
- [6] J.B. Diaz and B. Margolis: *A fixed point theorem of the alternative, for contractions on a generalized complete metric space*, Bull. Amer. Math. Soc. (N.S.), **74**(1968), No. 2, 305-309.
- [7] G.-L. Forti and L. Paganoni: *Works on functional equations and inequalities in several variables XX*, Aequationes Math., **65**(2003), 165-200.
- [8] P. Găvruta: *A generalization of the Hyers-Ulam-Rassias stability of approximately additive mappings*, J. Math. Anal. Appl., **184**(1994), No. 3, 431-436.
- [9] N. Haokip and N. Goswami: *Stability of additive and quadratic functional equations*, Adv. Math. Sci. J., **9**(2020), No. 10, 8443-8454.
- [10] N. Haokip: *On the stability of an Euler Lagrange type cubic functional equation using the fixed point method*, Int. J. Nonlinear Anal. Appl., **13**(2022), No. 2, 1841-1848.
- [11] D.H. Hyers: *On the stability of the linear functional equation*, Proc. Natl. Acad. Sci. USA, **27**(1941), No. 4, 222-224.
- [12] S.-M. Jung: *A fixed point approach to the stability of isometries*, J. Math. Anal. Appl., **329**(2007), No. 2, 879-890.
- [13] S.-M. Jung: *Hyers-Ulam-Rassias Stability of Functional Equations in Nonlinear Analysis*, Springer, 2011.
- [14] D. Kang and H. Koh: *On stability problems of a functional equation deriving from a quintic function*, J. Comput. Anal. Appl., **26**(2019), No. 1, 110-120.
- [15] M.A. Khamsi and W.A. Kirk: *An Introduction to Metric Spaces and Fixed Point Theory*, John Wiley & Sons, 2011.
- [16] H. Koh: *A fixed point approach to the stability of quintic mappings in quasi- β -normed spaces*, J. Chungcheong Math. Soc., **26**(2013), No. 4, 757-767.

Received: November 01, 2024. *Revised:* February 14, 2025.

2020 Mathematics Subject Classification: 39B82, 47H10.

Key words and phrases: Hyers-Ulam-Rassias stability, quartic functional equation, fixed point.

- [17] Y-H. Lee: *On the Hyers-Ulam-Rassias stability of a general quintic functional equation and a general sextic functional equation*, Mathematics, **7**(2019), No. 6, Art. No. 510, 14 pages.
- [18] D. Mihet and V. Radu: *On the stability of the additive Cauchy functional equation in random normed spaces*, J. Math. Anal. Appl., **343**(2008), No. 1, 567-572.
- [19] M. Mirzavaziri and M.S. Moslehian: *A fixed point approach to stability of a quadratic equation*, Bull. Braz. Math. Soc. (N.S.), **37** (2006), No. 3, 361-376.
- [20] C. Park, J. L. Cui and M.E. Gordji: *Orthogonality and quintic functional equations*, Acta Math. Sin. (Engl. Ser.), **29**(2013), No. 7, 1381-1390.
- [21] T.M. Rassias: *On the stability of the linear mapping in Banach spaces*, Proc. Amer. Math. Soc., **72**(1978), No. 2, 297-300.
- [22] J.M. Rassias: *Solution of the Ulam stability problem for quartic mappings*, Glas. Mat. Ser. III, **34**(1999), No. 54, 243-252.
- [23] J.M. Rassias: *Solution of the Ulam stability problem for cubic mappings*, Glas. Mat. Ser. III, **36**(2001), No. 1, 63-72.
- [24] F. Skof: *Proprieta' locali e approssimazione di operatori*, Rend. Sem. Mat. Fis. Milano, **53**(1983), No. 1, 113-129.
- [25] L. Székelyhidi: *Convolution Type Functional Equations on Topological Abelian Groups*, World Scientific, Singapore, 1991.
- [26] T. Xu, J. Rassias, M. Rassias *et al.*: *A fixed point approach to the stability of quintic and sextic functional equations in quasi- β -normed spaces*, J. Inequal. Appl., **2010**(2011), Article ID 423231, 23 pages.
- [27] T.Z. Xu, J. M. Rassias and W.X. Xu: *A generalized mixed quadratic-quartic functional equation*, Bull. Malays. Math. Sci. Soc., **35**(2012), No. 3, 633-649.

Churachandpur College
Department of Mathematics
IB Road, Churachandpur, Manipur – 795128, India
Email address: mark02mm@yahoo.co.in