

APPROXIMATION OF QUADRATIC LIE $*$ -DERIVATIONS ON ρ -COMPLETE CONVEX MODULAR ALGEBRAS

HARK-MAHN KIM, JIN-SEOK PARK AND HWAN-YONG SHIN

Abstract. In this paper, we investigate stable approximation of almost quadratic Lie $*$ -derivations associated with approximate quadratic mappings on ρ -complete convex modular algebras \mathcal{X}_ρ by using Δ_2 -condition via convex modular ρ .

Mathematics subject classification (2010): 39B52, 39B72, 46H30, 16W25.

Keywords and phrases: Generalized Hyers–Ulam stability, ρ -complete convex modular algebras, quadratic Lie $*$ -derivations, Δ_2 -condition.

REFERENCES

- [1] T. AOKI, *On the stability of the linear transformation in Banach spaces*, J. Math. Soc. Japan, **2** (1950), 64–66.
- [2] A. BODAGHI AND S.G. KIM, *Ulam's type stability of a functional equation deriving from quadratic and additive functions*, J. Math. Inequalities, **9** (2015), 73–84, doi:10.7153/jmi-09-07.
- [3] C. BORELLI AND G.L. FORTI, *On a general Hyers–Ulam stability result*, Internat. J. Math. Math. Sci. **18** (1995), 229–236, doi:10.1155/S0161171295000287.
- [4] S. CZERWIK, *On the stability of the quadratic mapping in normed spaces*, Abh. Math. Sem. Univ. Hamburg, **62** (1992), 59–64, doi:10.1007/BF02941618.
- [5] P. GÄVRUTA, *A generalization of the Hyers–Ulam–Rassias stability of approximately additive mappings*, J. Math. Anal. Appl. **184** (1994), 431–436, doi:10.1006/jmaa.1994.1211.
- [6] D.H. HYERS, *On the stability of the linear functional equation*, Proc. Nat. Acad. Sci. U.S.A. **27** (1941), 222–224, doi:10.1073/pnas.27.4.222.
- [7] M.A. KHAMSI, *Quasicontraction mappings in modular spaces without Δ_2 -condition*, Fixed Point Theory Appl. Article ID. 916187, 6 pages, (2008).
- [8] H.-M. KIM AND Y. HONG, *Approximate Cauchy–Jensen type mappings in modular spaces*, Far East J. Math. Sci. **102** no. 7 (2017), 1319–1336.
- [9] H.-M. KIM AND Y. HONG, *Approximate quadratic mappings in modular spaces*, Int. J. Pure Appl. Math. **116** (2017), 31–43.
- [10] C. KIM AND S.W. PARK, *A fixed point approach to the stability of additive-quadratic functional equations in modular spaces*, J. Chungcheong Math. Soc., **28**(2), 2015, 321–330, doi.org/10.14403/jcms.2015.28.2.321.
- [11] Y.-H. LEE, S.-M. JUNG AND M. T. RASSIAS, *Uniqueness theorems on functional inequalities concerning cubic-quadratic-additive equation*, J. Math. Inequalities, **12**, 2018, 43–61, doi:10.7153/jmi-2018-12-04.
- [12] J. MUSIELAK AND W. ORLICZ, *On Modular Spaces*, Studia Math. Vol. **18** (1959).
- [13] H. NAKANO, *Modulated Semi-Ordered Linear Spaces*, Tokyo Math. Book Ser, Vol. **1** Maruzen Co, Tokyo (1950).
- [14] J.M. RASSIAS, *On the stability of the Euler–Lagrange functional equation*, Chinese J. Math. **20** no. 2 (1992), 185–190.
- [15] H.M. RASSIAS, *On the stability of the linear mapping in Banach spaces*, Proc. Amer. Math. Soc. **72** (1978), 297–300, doi:10.1090/S0002-9939-1978-0507327-1.
- [16] G. SADEGHI, *A fixed point approach to stability of functional equations in modular spaces*, Bull. Malays. Math. Sci. Soc. **37** no. 2 (2014), 333–344.

- [17] F. SKOF, *Local properties and approximations of operators*, Rend. Sem. Mat. Fis. Milano, **53** (1983), 113–129.
- [18] S.M. ULAM, *Problems in Modern Mathematics*, Chap. VI, Wiley, New York, (1960).
- [19] K. WONGKUM, P. CHAIPUNYA, AND P. KUMAM, *On the generalized Ulam–Hyers–Rassias stability of quadratic mappings in modular spaces without Δ_2 -conditions*, J. Funct. Spaces, Vol. 2015, Article ID 461719, 6 pages, doi:10.1155/2015/461719.
- [20] K. WONGKUM AND P. KUMAM, *The stability of sextic functional equation in fuzzy modular spaces*, J. Nonlinear Sci. Appl. **9** (2016), 3555–3569.
- [21] Z. YANG, W. REN, T. XU, *Ulam–Hyers stability for matrix-valued fractional differential equations*, J. Math. Inequalities, **12**, (2018), 665–675.