

ON THE ORTHOGONAL PEXIDER DERIVATIONS IN ORTHOGONALITY BANACH ALGEBRAS

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Abstract. In the present paper, we introduce a new system of functional equations, known as orthogonal Pexider derivations. We investigate the stability and hyperstability of this class of functional equations, including the orthogonal Pexider ring derivation and the orthogonal Pexider Jordan ring derivation, by using the fixed point method.

Key Words and Phrases: Orthogonal Pexiderized derivations, ring derivation, Jordan ring derivation, orthogonality Banach algebra, Hyers-Ulam stability, fixed point alternative.

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REFERENCES

- [1] J. Alonso, C. Benítez, *Carlos orthogonality in normed linear spaces: A survey. II. Relations between main orthogonalities*, Extracta Math., **4**(1989), 121-131.
- [2] J. Alonso, C. Benítez, *Orthogonality in normed linear spaces: A survey. I. Main properties*, Extracta Math., **3**(1988), 1-15.
- [3] R. Badora, *On approximate derivations*, Math. Inequal. Appl., **9**(2006), 167-173.
- [4] J. Baker, *The stability of the cosine equation*, Proc. Amer. Math. Soc., **80**(1980), 411-416.
- [5] J. Baker, J. Lawrence, F. Zorzitto, *The stability of the equation $f(x+y) = f(x)f(y)$* , Proc. Amer. Math. Soc., **74**(1979), 242-246.
- [6] J.A. Baker, *The stability of certain functional equations*, Proc. Amer. Math. Soc., **112**(1991), 729-732.
- [7] M. Eshaghi Gordji, A. Najati, *Approximately J^* -homomorphisms: A fixed point approach*, J. Geom. Phys., **60**(2010), 809-814.
- [8] P. Găvruta, *A generalization of the Hyers-Ulam-Rassias stability of approximately additive mappings*, J. Math. Anal. Appl., **184**(1994), 431-436.
- [9] R. Ger, *Superstability is not natural*, Rocznik Nauk.-Dydakt. Prace Mat., **159**(1993), 109-123.
- [10] R. Ger, P. Šemrl, *The stability of the exponential equation*, Proc. Amer. Math. Soc., **124**(1996), 779-787.
- [11] S. Gudder, D. Strawther, *Orthogonally additive and orthogonally increasing functions on vector spaces*, Pacific J. Math., **58**(1975), 427-436.
- [12] D.H. Hyers, *On the stability of the linear functional equation*, Proc. Nat. Acad. Sci. USA., **27**(1941), 222-224.

- [13] D.H. Hyers, G. Isac, Th.M. Rassias, *Stability of Functional Equations in Several Variables*, Birkhäuser, Boston, 1998.
- [14] K.W. Jun, D.S. Shin, B.D. Kim, *On the Hyers-Ulam-Rassias stability of the Pexider equation*, J. Math. Anal. Appl., **239**(1999), 20-29.
- [15] Y.-H. Lee, K.-W. Jun, *A generalization of the Hyers-Ulam-Rassias stability of Pexider equation*, J. Math. Anal. Appl., **246**(2000), 627-638.
- [16] B. Margolis, J. Diaz, *A fixed point theorem of the alternative for contractions on a generalized complete metric space*, Bull. Amer. Math. Soc., **74**(1968), 305-309.
- [17] V. Radu, *The fixed point alternative and the stability of functional equations*, Fixed Point Theory, **4**(2003), 91-96.
- [18] Th.M. Rassias, *On the stability of functional equations in Banach spaces*, J. Math. Anal. Appl., **251**(2000), 264-284.
- [19] Th.M. Rassias, *On the stability of the linear mapping in Banach spaces*, Proc. Amer. Math. Soc., **72**(1978), 297-300.
- [20] J. Rätz, *On orthogonally additive mappings*, Aequat. Math., **28**(1985), 35-49.
- [21] P. Šemrl, *The functional equation of multiplicative derivation is superstable on standard operator algebras*, Inegr. Equat. Oper. Th., **18**(1994), 118-122.
- [22] L. Székelyhidi, *On a theorem of Baker, Lawrence and Zorzitto*, Proc. Amer. Math. Soc., **84**(1982), 95-96.
- [23] S.M. Ulam, *A Collection of Mathematical Problems*, Interscience Publ., New York, 1960.

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