CARPATHIAN J. MATH. Volume **35** (2019), No. 1, Pages 13 - 22 Online version at https://www.carpathian.cunbm.utcluj.ro/ Print Edition: ISSN 1584 - 2851; Online Edition: ISSN 1843 - 4401 DOI: https://doi.org/10.37193/CJM.2019.01.02

Best Ulam constant for a linear difference equation

ALINA-RAMONA BAIAS, FLORINA BLAGA and DORIAN POPA

Abstract.

In this paper we provide some results on Ulam stability for the linear difference equation of order one in Banach spaces and we determine its best Ulam constant. The main result is applied to a process of loan amortization.

References

- Agarwal, R. P., Xu, B. and Zhang, W., Stability of functional equations in single variable, J. Math. Anal. Appl., 288 (2003), 852–869
- [2] Atalan, Y. and Karakaya, V., Stability of nonlinear Volterra-Fredholm integro differential equation: a fixed point approach, Creat. Math. Inform., 26 (2017), No. 3, 247–254
- [3] Bojor, F., On the stability of quartic type functional equation, Creat. Math. Inform., 17 (2008), No. 3, 319–325 (2009)
- [4] Bojor, F., Generalized additive Cauchy equations and their Ulam-Hyers stability, Creat. Math. Inform., 18 (2009), No. 2, 129–135
- [5] Brillouët-Belluot, N., Brzdek, J. and Cieplinski, K., On some recent developments in Ulam's type stability, Abstr. Appl. Anal., (2012), 41 pp.
- [6] Brzdek, J., Popa, D., Raşa, I. and Xu, B., Ulam stability of Operators, Academic Press, 2018
- [7] Brzdek, J. and Jung, S. M., A note on stability of an operator linear equation of the second order, Abstr. Appl. Anal., (2011), Article ID 602713, 15 pp.
- [8] Brzdek, J., Popa, D. and Xu, B., The Hyers-Ulam stability of nonlinear recurrences, J. Math. Anal. Appl., 335 (2007), 443–449
- [9] Dumitrescu, S., Monea, M. and Mortici, C., A survey on the stability of mean value points and functional equations involving some special functions, Creat. Math. Inform., 24 (2015), No. 1, 27–42
- [10] Elaydi, S., An introduction to difference equations, Springer, 2005
- [11] Guran, L., Ulam-Hyers stability of fixed point equations for singlevalued operators on KST spaces, Creat. Math. Inform., 21 (2012), No. 1, 41–47
- [12] Hatori, O., Kobayashi, K., Miura, T., Takagi, H. and Takahasi, S. E., On the best constant of Hyers-Ulam stability, J. Nonlinear Convex Anal., 5 (2004), 387–393
- [13] Hyers, D. H., Isac, G. and Rassias, Th. M., Stability of Functional Equations in Several Variables, Birkhäuser Boston, Inc., 1998
- [14] Jung, S. M. and Rassias, Th. M., A linear functional equation of third order associated to the Fibonacci numbers, Art. ID 137468, 7 pp., 2014
- [15] Lazăr, V. L., Ulam-Hyers stability for partial differential equations, Creat. Math. Inform., 21 (2012), No. 1, 73–78
- [16] Mleşniţe, O. M., Ulam-Hyers stability for operatorial inclusions Creat. Math. Inform., 21 (2012), No. 1, 87–94
- [17] Onitsuka, M., Hyers-Ulam stability of first-order nonhomogeneous linear difference equations with a constant stepsize, Appl. Math. Comput., 330 (2018), No. 1, 143–151
- [18] Popa, D., Hyers-Ulam stability of the linear recurrence with constant coefficients, Adv. Difference Equ., 2 (2005), 101–107

Received: 08.06.2018; In revised form: 03.12.2018; Accepted: 10.12.2018 2010 Mathematics Subject Classification. 39A30, 39B82.

Key words and phrases. *linear difference equations, Ulam stability, best constant.* Corresponding author: Dorian Popa; Popa.Dorian@math.utcluj.ro.

- [19] Popa, D., Hyers-Ulam-Rassias stability of a linear recurrence, J. Math. Anal. Appl., 309 (2005), No. 2, 591-597
- [20] Popa, D. and Raşa, I., On the stability of some classical operators from approximation theory, Expo. Math., 31 (2013), 205–214
- [21] Popa, D. and Raşa, I., Best constant in stability of some positive linear operators, Aequationes Math., 90 (2016), 719–726
- [22] Popa, D. and Raşa, I., On the best constant in Hyers-Ulam stability of some positive linear operators, J. Math. Anal. Appl., 412 (2014), 103–108
- [23] Takagi, H., Miura, T. and Takahasi, S. E., Essential norms and stability constants of weighted composition operators on C(X), Bull. Korean Math. Soc., 40, (2003), 583–591
- [24] Ulam, S. M., A Collection of Mathematical Problems, Interscience, New York, 1960

DEPARTMENT OF MATHEMATICS TECHNICAL UNIVERSITY OF CLUJ-NAPOCA G. BARIŢIU 25, 400027 CLUJ-NAPOCA, ROMANIA Email address: Baias.Alina@math.utcluj.ro. Email address: Blaga.Florina@math.utcluj.ro. Email address: Popa.Dorian@math.utcluj.ro.