HYERS-ULAM STABILITY OF THE LAPLACE OPERATOR

DORIAN POPA AND IOAN RAŞA

Technical University of Cluj-Napoca, Department of Mathematics,

28 Memorandumului Street, 400114, Cluj-Napoca, Romania

E-mail: Popa.Dorian@math.utcluj.ro

Ioan.Rasa@math.utcluj.ro

Abstract. We investigate the Hyers-Ulam stability of the Laplace operator Δ and of a multiple of it, acting on suitable domains. Moreover, we obtain an explicit representation of the Hyers-Ulam constant.

Key Words and Phrases: Hyers-Ulam stability, Laplace operator, Digamma function.

2010 Mathematics Subject Classification: 39B82, 35J15, 47S07.

References

[1] M. Abramowitz, I.A. Stegun, *Handbook of Mathematical Functions and Formulas*, Graphs and Mathematical Tables, New-York, Dover, 1972.

[2] F. Altomare and M. Campiti, *Korovkin-type Approximation Theory and its Applications*, W. De Gruyter, Berlin - New York, 1994.

[3] F. Altomare, M. Cappelletti Montano, V. Leonessa, I. Raşa, *Markov Operators, Positive Semigroups and Approximation Processes*, W. De Gruyter Studies in Mathematics, Vol. 61, 2014.

[4] Sz. András, A.R. Mészáros, *Ulam-Hyers stability of elliptic partial differential equations in Sobolev spaces*, Appl. Math. Comput., **229**(2014), 131-138.

[5] E. Gselmann, *Stability properties in some classes of second order partial differential equations*, Results Math., **65**(2014), 95-103.

[6] O. Hatori, K. Kobayasi, T. Miura, H. Takagi, S.E. Takahasi, *On the best constant of Hyers-Ulam stability*, J. Nonlinear Convex Anal., **5**(2004), 387-393.

[7] B. Hegyi, S.-M. Jung, *On the stability of Laplace's equation*, Appl. Math. Lett., **26**(2013), 549-552.

[8] D.H. Hyers, G. Isac, Th. M. Rassias, *Stability of Functional Equations in Several Variables*, Birkhäuser, Basel, 1998.

[9] R. Precup, *Linear and semilinear partial differential equations*, W. De Gruyter, 2013.

[10] I. Raşa, *Positive operators, Feller semigroups and diffusion equations associated with Altomare projections*, Conf. Sem. Mat. Univ. Bari, **284**(2002), 26 pp.

[11] H. Takagi, T. Miura, S.-E. Takahasi, *Essential norms and stability constants of weighted composition operators on $C(X)$*, Bull. Korean Math. Soc., **40**(2003), 583-591.