

## ON THE EXISTENCE OF ASYMPTOTICALLY STABLE SOLUTIONS FOR A MIXED FUNCTIONAL INTEGRAL EQUATION IN $N$ VARIABLES

LE THI PHUONG NGOC AND NGUYEN THANH LONG

*Abstract.* The aim of this paper is to study the existence of asymptotically stable solutions for a mixed functional integral equation in  $N$  variables. This is done by using a fixed point theorem of Krasnosel'skii type in the Fréchet space and the new integral inequalities with explicit estimate. In order to illustrate the results obtained here, an example is given.

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### REFERENCES

- [1] M. A. Abdou, A. A. Badr, M. M. El-Kojok, *On the solution of a mixed nonlinear integral equation*, Applied Mathematics and Computation, **217**, (12) (2011), 5466–5475.
- [2] C. Avramescu, C. Vladimirescu, *An existence result of asymptotically stable solutions for an integral equation of mixed type*, Electronic J. Qualitative Theory of Diff. Equat., **25** (2005), 1–6.
- [3] C. Avramescu, *Some remarks on a fixed point theorem of Krasnosel'skii*, Electronic J. Qualitative Theory of Diff. Equat., No. 5 (2003), 1–15.
- [4] C. Avramescu, C. Vladimirescu, *Fixed point theorems of Krasnoselskii' type in a space of continuous functions*, Fixed Point Theory, **5**, (2) (2004), 181–195.
- [5] C. Avramescu, C. Vladimirescu, *On the existence of asymptotically stable solutions of certain integral equations*, Nonlinear Anal. TMA., **66**, (2) (2007), 472–483.
- [6] C. Corduneanu, *Integral equations and applications*, Cambridge University Press, New York, 1991.
- [7] K. Deimling, *Nonlinear Functional Analysis*, Springer, New York, 1985.
- [8] M. M. El-Borai, M. A. Abdou, M. M. El-Kojok, *On a discussion of nonlinear integral equation of type Volterra-Hammerstein*, J. Korea Soc. Math. Educ., Ser. B, Pure Appl. Math., **15**, (1) (2008), 1–17.
- [9] S. Lang, *Analysis II*, Addison - Wesley, Reading, Mass., California London, 1969.
- [10] Zeqing Liu, Shin Min Kang, Jeong Sheok Ume, *Solvability and asymptotic stability of a nonlinear functional-integral equation*, Applied Mathematics Letters, **24**, (6) (2011), 911–917.
- [11] N. Lungu, I. A. Rus, *On a functional Volterra- Fredholm integral equation via Picard operator*, Journal of Mathematical Inequalities, **3**, (4) (2009), 519–527.
- [12] L.T.P. Ngoc, N.T. Long, *On a fixed point theorem of Krasnosel'skii type and application to integral equations*, Fixed Point Theory and Applications, Vol. **2006** (2006), Article ID 30847, 24 pages.
- [13] L.T.P. Ngoc, N.T. Long, *Solving a system of nonlinear integral equations and existence of asymptotically stable solutions*, Differential Equations & Applications, **4** (2) (2012), 233–255.
- [14] L.T.P. Ngoc, N.T. Long, *On a nonlinear Volterra - Hammerstein integral equation in two variables*, Acta Mathematica Scientia, **33B** (2) (2013), 484–494.
- [15] L.T.P. Ngoc, N.T. Long, *Applying a fixed point theorem of Krasnosel'skii type to the existence of asymptotically stable solutions for a Volterra - Hammerstein integral equation*, Nonlinear Anal. TMA., **74**, (11) (2011), 3769–3774.
- [16] B.G. Pachpatte, *On Fredholm type integral equation in two variables*, Differ. Equ. Appl., **1**, (1) (2009), 27–39.

- [17] B.G. Pachpatte, *Volterra integral and integrodifferential equations in two variables*, J. Inequal. Pure and Appl. Math., **10**, (4) (2009), Art. 108, 10 pp.
- [18] I.K. Purnaras, *A note on the existence of solutions to some nonlinear functional integral equations*, Electronic J. Qualitative Theory of Diff. Equat., No. 17. (2006), 1–24.