

An application of a fixed point theorem in cone metric spaces for solving differential equations

MONICA LAURAN and ANDREI HORVAT-MARC

ABSTRACT.

In this paper we establish sufficient conditions for the existence and uniqueness of solutions for third order differential equations using a fixed point theorem in cone metric space. The presented result is based on some properties of invertible operators and extends several well-known comparable results in the literature.

REFERENCES

- [1] Aage, C. T. and Salunke, J. N., *On common fixed points for contractive type mappings in cone metric spaces*, Bulletin of Mathematical Analysis and Applications, **1** (2009), No. 3, 10–15
- [2] Banas, J. et al., *Solutions of a functional integral equation in $BC(R_+)$* , International Mathematical Forum, **1** (2006), No. 24, 1181–1194
- [3] Beiranvand, A., Moradi, S., Omid, M. and Pazandeh, H., *Two fixed point theorem for special mapping*, arXiv:0903.1504v1 [math.FA]
- [4] Berinde, V., *Abstract φ -contractions which are Picard mappings*, Mathematica, **34(57)** (1992), No. 2, 107–111
- [5] Edelstein, M., *On fixed and periodic points under contractive mappings*, J. London Math. Soc., **37** (1962), 74–79
- [6] Huang, L.-G. and Zhang, X., *Cone metric spaces and fixed point theorems of contractive mappings*, J. Math. Anal. Appl., vol. **332**, No. 2, 2007, 1468–1476
- [7] Kadelburg, Z., Radenović, S. and Rakočević, *A note on the equivalence of some metric and cone metric fixed point results*, Applied Mathematics Letters, **24** (2011), 370–374
- [8] Morales, J. R. and Rojas, E., *Cone metric spaces and fixed point theorems of T -contractive mappings*, Notas de Matematica, vol. **4(2)**, No. 269, 2008, 66–78
- [9] Morales, J. R. and Rojas, E., *Cone Metric Spaces and Fixed Point Theorems of T -Kannan Contractive Mappings*, Int. Journal of Math. Analysis, Vol. **4**, 2010, No. 4, 175–184
- [10] Olaleru, J. O., *Some generalizations of fixed point theorems in cone metric spaces*, Fixed Point Theory Appl., 2009, 10 (2009). Article ID 657914
- [11] Rezapour, Sh. and Hambarani, R., *Some notes on the paper cone metric spaces and fixed point theorems of contractive mappings*, J. Math. Anal. Appl., 345, 719724 (2008). doi:10.1016/j.jmaa.2008.04.049
- [12] Şerban, M. A., *A nonlinear mixed type Volterra-Fredholm functional integral equation via Perov's theorem*, TJMM, **2** (2010), No. 1, 75–87
- [13] Vetro, P., *Common fixed points in cone metric spaces*, Rend. Circ. Mat. Palermo., **56**, 464–468 (2007). doi:10.1007/BF03032097
- [14] Zabreiko, P. P., *K -metric and K -normed spaces: survey*, Collect Math., **48** (1997), 825–859

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
FACULTY OF SCIENCES NORTH UNIVERSITY CENTER AT BAI A MARE
TECHNICAL UNIVERSITY OF CLUJ-NAPOCA
VICTORIEI 76, 430122 BAI A MARE, ROMANIA
E-mail address: lauranmonica@yahoo.com
E-mail address: andrei.horvatmarc@unbm.ro