

## FIXED POINT THEOREMS ON CARTESIAN PRODUCT

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**Abstract.** In this paper we study the existence of the fixed point for operators on cartesian product  $f : X \times Y \rightarrow X \times Y$ ,  $f = (f_1, f_2)$ , in terms of the operators  $f_1(\cdot, y) : X \rightarrow X$  and  $f_2(x, \cdot) : Y \rightarrow Y$ .

**Key Words and Phrases:** fixed point, fibre contraction principle, ordered set, generalized metric.

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### REFERENCES

- [1] S. Andrász, *Ecuații integrale Fredholm-Volterra*, Ed. Didactică și Pedagogică, București, 2005.
- [2] S. Andrász, *Fibre  $\varphi$ -contraction on generalized metric spaces and applications*, Mathematica, **45**(68)(2003), 3-8.
- [3] C. Avramescu, *Asupra unei teoreme de punct fix*, St. Cerc. Mat., **22**(1970), 215-221.
- [4] C. Bacoțiu, *Fibre Picard operators on generalized metric spaces*, Sem. on Fixed Point Theory Cluj-Napoca, **1**(2000), 5-8.
- [5] V. Berinde, *Contractioni generalizate și aplicații*, CUB Press 22, Baia Mare, 1997.
- [6] L.M. Blumenthal, *Theory and applications of distance geometry*, Oxford University Press, 1953.
- [7] R.F. Brown, *On some old problems of fixed point theory*, Rocky Mountain J. Math., **4**(1974), 3-14.
- [8] R.F. Brown, *The fixed point property and cartesian products*, The Amer. Math. Monthly, **89**(1982), 654-678.
- [9] St. Czerwinski, *Fixed point theorems and special solution of functional equations*, Uniwersytet Śląski, 1980.

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- [10] M. Fréchet, *Les espaces abstraits*, Gauthier-Villars, Paris, 1928.
- [11] J. Jachymski, I. Józwik, *Nonlinear contractive conditions: A comparison and related problems*, Fixed Point Theory and Its Applications, Banach Center Publications, **77**(2007), 123-146.
- [12] J. Matkowski, *Some inequalities and a generalization of Banach's principle*, Bull. Acad. Polon. Sci. Ser. Sci. Math. Astronom. Phys., **21**(1973), 323-324.
- [13] R. Precup, *Methods in Nonlinear Integral Equations*, Kluwer, Dordrecht, 2002
- [14] R. Precup, *The role of convergent to zero matrices in the study of semilinear operator systems*, to appear.
- [15] I. A. Rus, *Asupra punctelor fixe ale aplicațiilor definite pe produs cartezian, I: Structuri algebrice*, Studii și cercetări matematice, **24**(1972), 891-896.
- [16] I. A. Rus, *Asupra punctelor fixe ale aplicațiilor definite pe produs cartezian, II: Spații metrice*, Studii și Cercetări Matematice, **24**(1972), 897-904.
- [17] I. A. Rus, *Asupra punctelor fixe ale aplicațiilor definite pe produs cartezian*, Studia Univ. Babeș-Bolyai, Mathematica, **24**(1979), 2, 55-56.
- [18] I. A. Rus, *Fixed Point Structure Theory*, Cluj University Press, 2006.
- [19] I.A. Rus, *A fibre generalized contraction theorem and applications*, Mathematica, **41**(1999), 85-90.
- [20] I.A. Rus, *Fibre Picard operators and applications*, Studia Univ. Babeș-Bolyai Math., **44**(1999), 89-98.
- [21] I.A. Rus, *Fibre Picard operators on generalized metric spaces and applications*, Scripta Sc. Math., **1**(1999), 326-334.
- [22] I.A. Rus, *Generalized Contractions and Applications*, Cluj University Press, Cluj-Napoca, 2001.
- [23] I. A. Rus, *Picard operators and applications*, Scientiae Mathematicae Japonicae, **58**(2003), 191-219.
- [24] I. A. Rus, *Principii și aplicații ale teoriei punctului fix*, Ed. Dacia, Cluj-Napoca, 1979.
- [25] I. A. Rus, *Technique of fixed point structures*, Babes-Bolyai University, Seminar on Fixed Point Theory, Preprint No. 3, 1987, 3-16.
- [26] I.A. Rus, *Weakly Picard operators and applications*, Seminar on Fixed Point Theory Cluj-Napoca, **2**(2001), 41-58.
- [27] M. A. Șerban, *Fibre contraction theorem in generalized metric spaces*, Automation Computers Applied Mathematics, **16**(2007), 9-14.
- [28] M.A. Șerban, *Fibre  $\varphi$ -contractions*, Studia Univ. Babeș-Bolyai, Math., **44**(1999), 99-108.
- [29] M. A. Șerban, *Technique of fixed point structure for the mapping on product spaces*, Babeș-Bolyai Univ., Seminar on Fixed Point Theory, Preprint No. 3, 1998, 1-18.
- [30] M.A. Șerban, *The fixed point theory for the operators on cartesian product*, Cluj University Press, Cluj-Napoca, 2002 (in Romanian).

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