

## N-ORDER UNIFORMLY NONCREASY BANACH LATTICES AND THE SUZUKI NONEXPANSIVE-TYPE MAPPINGS

ANNA BETIUK-PILARSKA

Institute of Mathematics, Maria Curie-Skłodowska University  
20-031 Lublin, Poland  
E-mail: abetiuk@hektor.umcs.lublin.pl

**Abstract.** We show that if  $K$  is a nonempty weakly compact convex subset of weakly orthogonal  $N$ -order uniformly noncreasy Banach lattice and  $T : K \rightarrow K$  satisfies condition  $(C)$  or is continuous and satisfies condition  $(C_\lambda)$  for some  $\lambda \in (0, 1)$ , then  $T$  has a fixed point. This generalizes a result from [?].

**Key Words and Phrases:** Nonexpansive mapping, Fixed point, Weakly orthogonal lattice, Mapping satisfying condition  $(C_\lambda)$ ,  $N$ -order uniformly noncreasy Banach lattice.

**2010 Mathematics Subject Classification:** 47H10, 46B20, 47H09.

### REFERENCES

- [1] A. Betiuk-Pilarska, S. Prus, *Banach lattices which are order uniformly noncreasy*, J. Math. Anal. Appl., **342**(2008), no. 2, 1271-1279.
- [2] A. Betiuk-Pilarska, S. Prus, *Banach lattices which are  $N$ -order uniformly noncreasy*, J. Math. Anal. Appl., **399**(2013), no. 2, 459-471.
- [3] A. Betiuk-Pilarska, A. Wiśnicki, *On the Suzuki nonexpansive-type mappings*, Ann. Funct. Anal. **4**(2013), no. 2, 72-86.
- [4] J.M. Borwein, B. Sims, *Non-expansive mappings on Banach lattices and related topics*, Houston J. Math., **10**(1984), 339-356.
- [5] T. Butsan, S. Dhompongsa, W. Takahashi, *A fixed point theorem for pointwise eventually non-expansive mappings in nearly uniformly convex Banach spaces*, Nonlinear Anal., **74**(2011), 1694-1701.
- [6] S. Dhompongsa, A. Kaewcharoen, *Fixed point theorems for nonexpansive mappings and Suzuki-generalized nonexpansive mappings on a Banach lattice*, Nonlinear Anal., **71**(2009), 5344-5353.
- [7] T. Domínguez Benavides, *A renorming of some nonseparable Banach spaces with the fixed point property*, J. Math. Anal. Appl., **350**(2009), 525-530.
- [8] K. Goebel, *On the structure of minimal invariant sets for nonexpansive mappings*, Ann. Univ. Mariae Curie-Skłodowska Sect. A, **29**(1975), 73-77.
- [9] L.A. Karlovitz, *Existence of fixed points of nonexpansive mappings in a space without normal structure*, Pacific J. Math., **66**(1976), 153-159.
- [10] W. Kurc, *A dual property to uniform monotonicity in Banach lattices*, Collect. Math., **44**(1993), 155-165.
- [11] J. Lindenstrauss, L. Tzafriri, *Classical Banach Spaces II*, Springer-Verlag, New York, 1979.
- [12] E. Lloréns Fuster, E. Moreno Gálvez, *The fixed point theory for some generalized nonexpansive mappings*, Abstr. Appl. Anal. 2011, Art. ID 435686, 15 pp.

- [13] W.A. Kirk, B. Sims (eds.), *Handbook of Metric Fixed Point Theory*, Kluwer Academic Publishers, Dordrecht, 2001.
- [14] J. García Falset, E. Lloréns Fuster, T. Suzuki, *Fixed point theory for a class of generalized nonexpansive mappings*, J. Math. Anal. Appl., **375**(2011), 185-195.
- [15] B. Sims, *Orthogonality and fixed points of nonexpansive maps*, Proc. Centre Math. Anal. Austral. Nat. Univ., **20**(1988), 178-186.
- [16] T. Suzuki, *Fixed point theorems and convergence theorems for some generalized nonexpansive mappings*, J. Math. Anal. Appl., **340**(2008), 1088-1095.

*Received: March 12, 2014; Accepted: November 13, 2014.*